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June 10, 1986

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6/10/86

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Subject:	Quality Assurance Project Plan for the Skinner Landfill Site
Work Assignment No.:	31-5L73.0
EPA Contract No.:	68-01-6939
Document No.:	130-WP1-OP-CVYR-1

Gentlemen:

Camp Dresser & McKee is pleased to submit this Quality Assurance Project Plan (QAPP) for the Remedial Investigation/Feasibility Study (RI/FS) at the Skinner Landfill site in the town of West Chester, Ohio for approval. The QAPP has been revised in accordance with the most recent U.S. EPA review, with the exception of residential well and groundwater analyses. Any questions regarding parameters and procedures specified for the residential well, the second and subsequent round of groundwater sampling, should be referred to the supplemental QAPP which is currently being produced.

If you have any questions, do not hesitate to contact me directly or the REM II Site Manager, R. Michael Bort, P.E.

Very truly yours,

CAMP DRESSER & MCKEE INC.

for John W. Hawthorne, P.E.
Senior Vice President
Region V Manager

cc: U. Joiner, Contracting Officer, U.S. EPA
L. Boornazian, Project Officer, U.S. EPA
N. Willis, Regional Coordinator, U.S. EPA

PERFORMANCE OF REMEDIAL RESPONSE
ACTIVITIES AT UNCONTROLLED HAZARDOUS
WASTE SITES (REM II)

U.S. EPA CONTRACT NO.: 68-01-6939

QUALITY ASSURANCE PROJECT PLAN (QAPP)
FOR
SKINNER LANDFILL; WEST CHESTER, OHIO

DOCUMENT NO.: 130-WP1-OP-CVYR-1

WORK ASSIGNMENT NO.: 31-5L73.0

Prepared by and Approved: Edward C. Reid Date: April 24, 1985
REM II Field Manager, RFW

Approved: Robert Karaneskas RMS Date: April 24, 1985
REM II Site Manager, RFW

Approved: for John W. Hawthorne Jim Yoshi Yani Date: April 29, 1985
REM II Regional Manager, CDM

Approved: David L Boyle Date: May 31, 1985
REM II Technical Operations Manager, CDM

Approved: Ken Wong Date: 8/15/86
U.S. EPA Remedial Project Manager

Approved: David A Payne for James H Adams Jr. Date: 8-14-86
U.S. EPA Region V QA Officer

Reviewed: Date: 8/13/86
U.S. EPA Director Central Regional Laboratory

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QUALITY ASSURANCE PROJECT PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SKINNER LANDFILL; WEST CHESTER, OHIO

SECTION 1

INTRODUCTION

The United States Environmental Protection Agency (U.S.EPA) requires participation of all U.S. EPA contractors in a centrally managed quality assurance (QA) program. This requirement applies to all environmental monitoring and measurement efforts mandated or supported by U.S. EPA.

Each contractor generating data has the responsibility to implement minimum procedures to assure that the precision, accuracy, completeness and representativeness of its data are known and documented. To ensure the responsibility is met uniformly, each U.S. EPA contractor must prepare a written QA Project Plan (QAPP) covering each project it is contracted to perform.

This QAPP presents the organization, objectives, functional activities and specific QA and quality control (QC) activities associated with the Remedial Investigation/Feasibility Study (RI/FS) at Skinner Landfill in West Chester, Ohio. The QAPP is designed to achieve the specific data quality goals of the RI/FS at Skinner Landfill.

SECTION 2

PROJECT DESCRIPTION

The remedial investigation portion of the RI/FS is designed to gather specific information necessary to determine if the site presents a hazard to human health or welfare or to the environment and to evaluate potentially feasible remedial actions. All tasks and subtasks are directed toward accomplishment of these primary objectives.

2.1 BACKGROUND

The Skinner Landfill is located about 15 miles north of Cincinnati in Union Township, Butler County, southwestern Ohio (Figure 2-1). The Skinner property comprises about 78 acres of hilly terrain situated east of Cincinnati-Dayton Road and west of a Consolidated Rail Corp. (Conrail) right-of-way near the Town of West Chester (Figure 2-2). The property is bordered on the north by wooded land and on the south by wooded and agricultural land. There are numerous single-family residences within 2000 feet of the site in all directions but northward. An elementary school is located on the Cincinnati-Dayton Road just across from the Skinner property (Figure 2-3).

The site is situated in a highly dissected area that slopes from a till-mantled, bedrock upland at elevations of 850 to 900 feet (M.S.L.) to a broad, flat-bottomed valley, which is occupied by Mill Creek, at elevations of 600 to 650 feet. Elevations within the Skinner property range from 650 to 750 feet. The property is traversed by two streams, one of which -- East Fork -- flows approximately west to east through the southern part of the site. The other stream (hereinafter called Skinner Creek) flows southwesterly, parallel to and about 600 feet east of Cincinnati-Dayton Road. In the angle between the two streams is an upland having two, en-echelon, elongated hills, which are also oriented roughly parallel to the Cincinnati-Dayton Road. Several ponds are present on the western flank of the western hill, which shows evidence of sand and gravel extraction.

In general, the site is underlain by relatively thin glacial drift (less than 35 feet) over interbedded shales and limestones of Ordovician age. Based on water well logs and boring logs from the limited on-site investigations, the soils are mixtures of sand, silt and clay in varying proportions. The soil stratigraphy is not well-defined. There appears to be a narrow buried valley that branches off from the Mill Creek buried valley towards West Chester. Drift thicknesses of up to 100 feet were found in West Chester, where a substantial layer of sand and gravel has served as a water supply

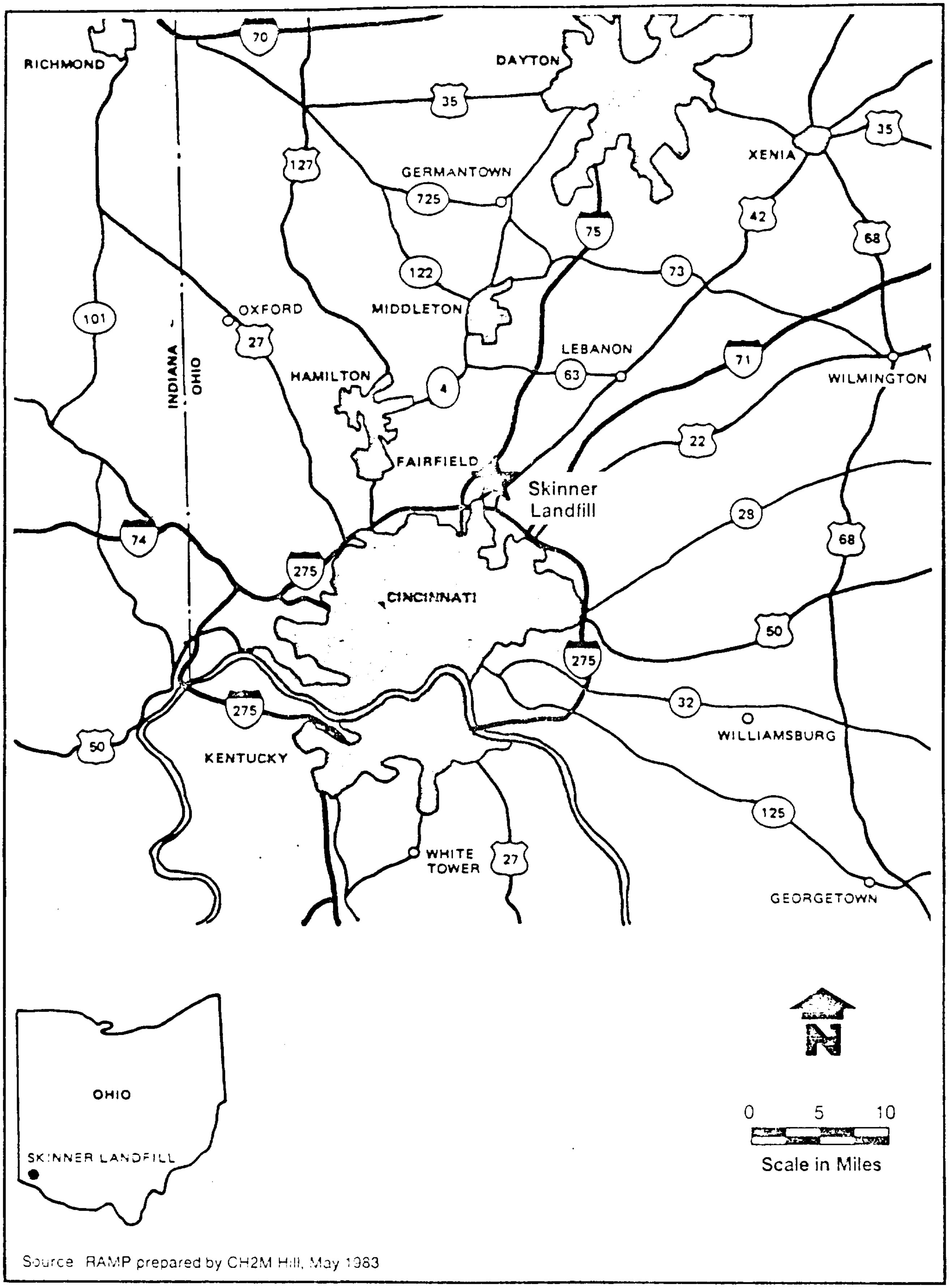


FIGURE 2-1 VICINITY MAP, SKINNER LANDFILL SITE

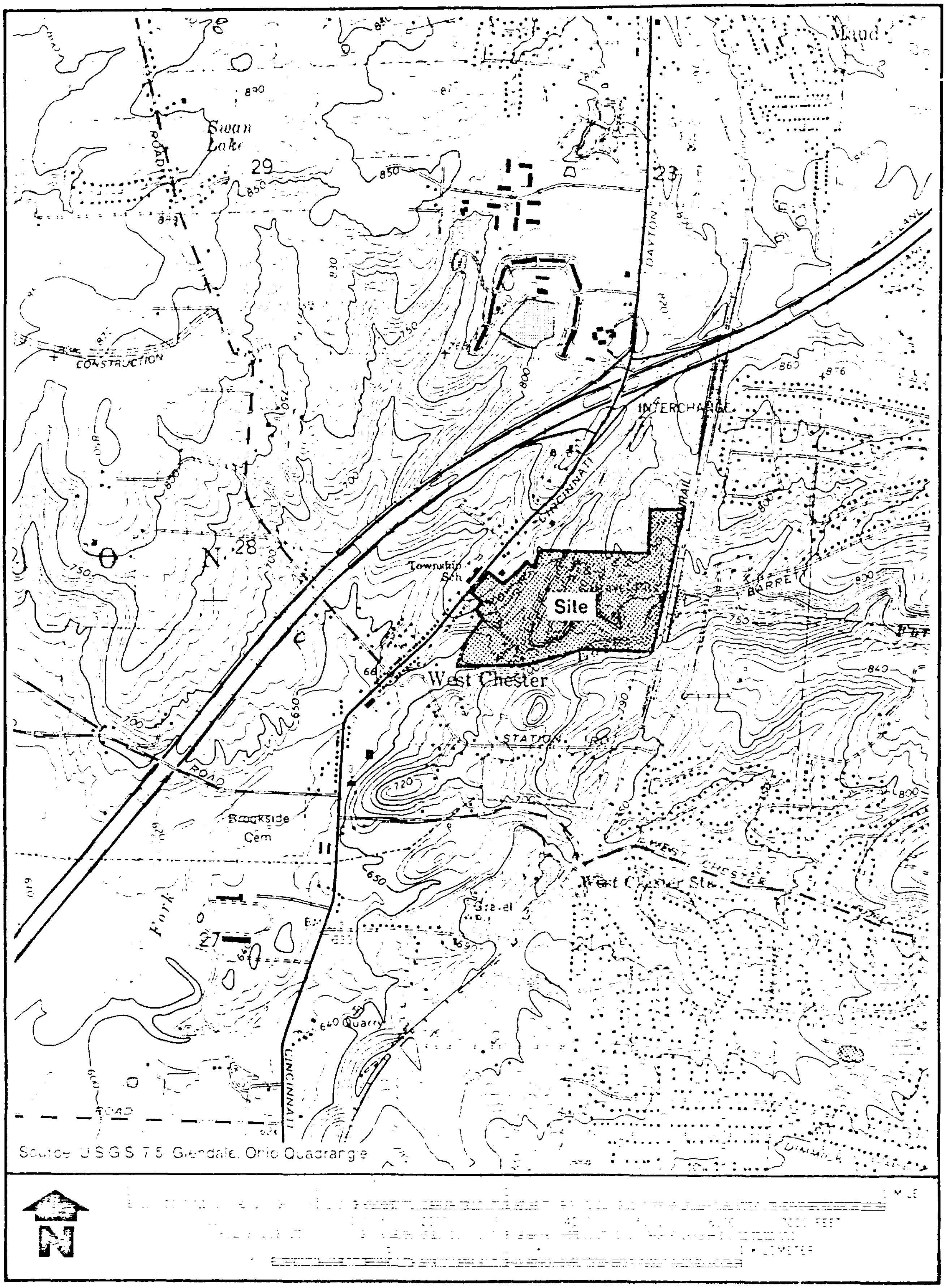


FIGURE 2-2 LOCATION MAP, SKINNER LANDFILL SITE

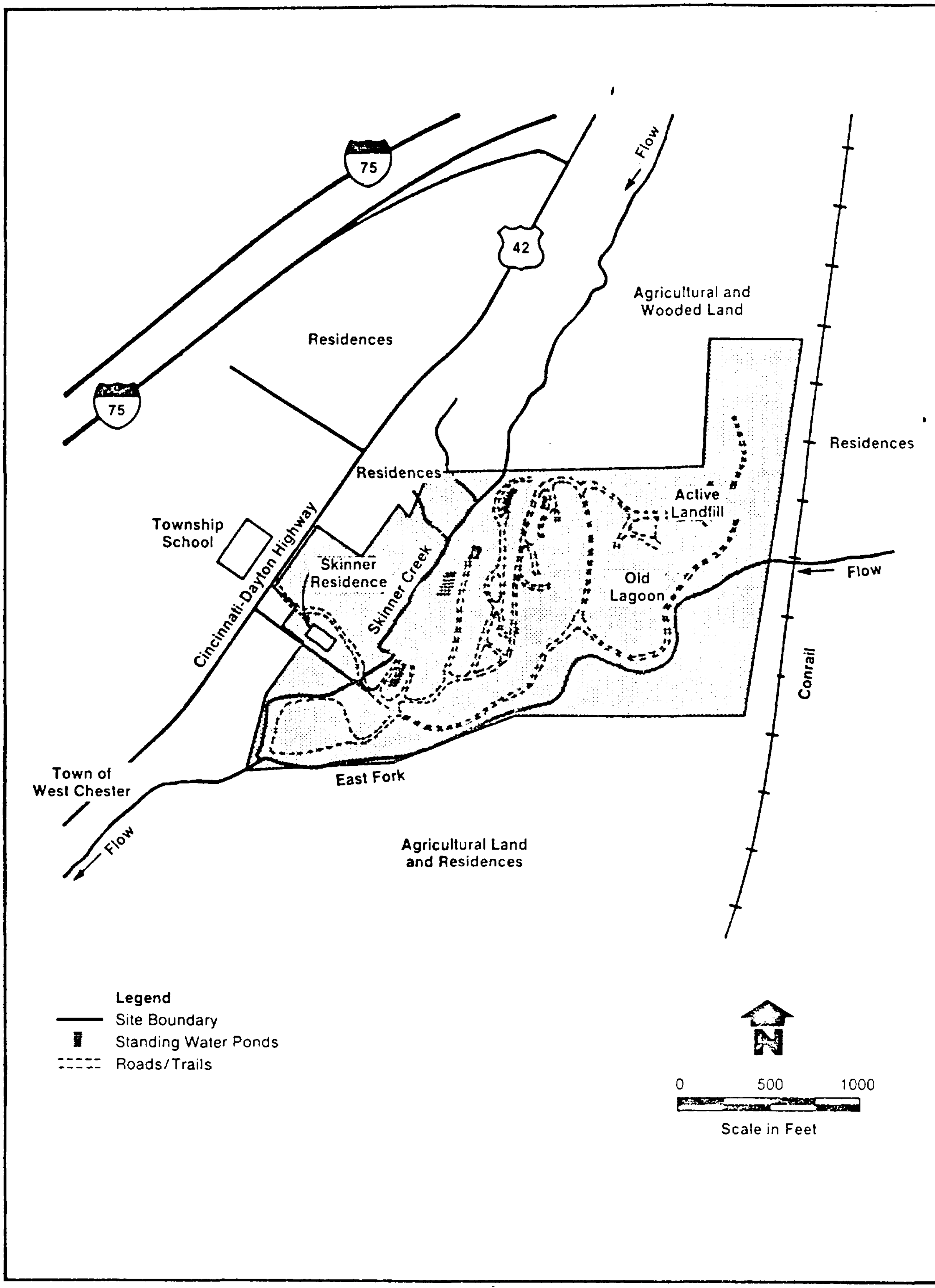


FIGURE 2-3 SITE MAP, SKINNER LANDFILL SITE

for many residences. This buried valley may extend into the Skinner property at its southeastern corner, in the vicinity of the confluence of the two streams. Preliminary hydrogeologic evaluations by St. John (1981) and Hosler (1976) concluded that groundwater flow in the vicinity of the site was most likely to the southwest, toward the buried valley. However, the depth and configuration of the water table in the site area are not well-defined.

Waste activities at the site apparently began 40 to 50 years ago. General municipal refuse was disposed in areas not being used for sand and gravel extraction. As early as 1964, there is confirmation that small amounts of industrial waste, including some now considered hazardous, were also being disposed of at the Skinner Landfill. Industrial waste activity apparently increased in the early 1970's, culminating in the situation discovered in April 1976.

While fighting a small brush fire at the Skinner site on April 18, 1976 firemen noticed a lagoon filled with black, oily-looking liquids. This observation, and a series of citizen complaints about heavy smoke and chemical odors during the previous two weeks, caused local health officials to request an investigation by Ohio EPA into possible chemical waste disposal at the site. Although initially allowed on-site, Ohio EPA personnel were denied permission to observe the lagoon.

When the Ohio EPA returned with a search warrant the following week, the area of the lagoon showed evidence of recent regrading. Discussions with neighboring residents revealed that heavy equipment had been operating at the site since the afternoon of the initial inspection and throughout the weekend. Strong chemical odors were present and about 100 drums marked "Chemical Waste" were observed, during the site visit. Later that week, inspection of aerial photographs taken in February 1976 confirmed that there had been a lagoon in the recently regraded area. These photographs also showed several hundred drums scattered throughout the site.

Early the next week, the first week of May, the Ohio EPA received a report that trucks had left the Skinner site over the previous weekend, late at night, with their lights off until they had driven one-half to one mile from the site. When the Ohio EPA attempted to inspect the site the next day, Mr. Skinner claimed that military ordinance and chemical warfare agents had been buried at the site. Pentagon assistance was requested, but no further on-site inspection was done that week. Heavy equipment was heard to be operating throughout that weekend.

On May 11, 1976, Ohio EPA and a U.S. Army Special Unit entered the site under a search warrant and excavated a trench into the buried lagoon. Samples of ooze taken from the trench and from crushed drums excavated from the trench contained high concentrations of pesticide intermediates, some volatile organics and several heavy metals. These waste materials are listed in Table 1. It was also noticed that many of the drums which had been present at the surface during earlier site inspections were no longer present.

From July 1976 to July 1977, the Skinners conducted a shallow geologic investigation and the Ohio EPA made a further site inspection and sampling visit. From August 1977 to January 1979, Ohio unsuccessfully tried to get a court ruling compelling Skinners to remove chemical waste from their site. Subsequent appeals were also unsuccessful. In July 1982, FIT installed four monitoring wells in the lagoon area for MITRE characterization of the site. Volatile organics were found in the well located southeast of the buried lagoon, indicating the release of hazardous contaminants to groundwater and their migration toward nearby East Fork. The parameters detected in this and other environmental samples at the Skinner Landfill are listed in Table 2-1. The analytical data for this well, and for all other sampling activities at or related to the Skinner Landfill, are contained in Appendix A.

2.2 PROJECT OBJECTIVES

The purpose of this Remedial Investigation/Feasibility Study (RI/FS) is to characterize the hazard or threat of hazard posed by the Skinner Landfill site and, if appropriate, to identify a cost-effective, environmentally sound remedial action as provided for by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Natural Oil and Hazardous Substances Contingency Plan 40 CFR Part 300 Subpart F (NCP). Before alternatives for remedial action can be considered in the FS, there must be sufficient information available to verify the need for remedial action, and to develop, screen and evaluate potential alternatives. The RI will be performed to gather and assess the data needed to accomplish the following:

- o Determine if pollution at the Skinner Landfill site pose a threat to health or the environment.
- o Determine the characteristics, extent and magnitude of contamination on the site.
- o Identify the pathways of contaminant migration from the site, and characterize the contaminant flux across the site boundaries.

TABLE 2-1

HAZARDOUS CHEMICALS FOUND AT
SKINNER LANDFILL

I. WASTE SAMPLES

Trichloropropane
Dichlorobenzene
1,3 Hexachlorobutadiene
Naphthalene
Hexachlorocyclopentadiene (C-56)
Methyl Naphthalene
Iso-Butyl Benzolate
Hexachloronorboradiene
Octachlorocyclopentene
Heptachloronorborene
Hexachlorobenzene
Chlordene
Methyl Benzophenone
Octachloropentafulvalene
Benzoic Acid
Phenols
Cyanide
Cadmium
Chromium
Lead
Zinc
Copper

II. ENVIRONMENTAL SAMPLES

DDT
Bis-(2-chloroisopropyl)ether
Benzene
1,2-Dichloroethane
1,1,1-Trichloroethane
1,1-Dichloroethane
Chloroethane
Chloroform
Trans-1,2-Dichloroethylene
1,2-Dichloropropane
Methylene Chloride
Toluene
Vinyl Chloride
One tentatively identified acid extractable
Seven tentatively identified base/neutral extractables
Twelve tentatively identified volatiles

- Evaluate the nature and magnitude of contamination, if any, in the nearby private water wells.
- Define on-site physical features and facilities that could affect contaminant migration, containment, or cleanup.
- Develop, screen and evaluate potential remedial action alternatives.
- Recommend the most cost-effective remedial action alternative(s) that adequately protects health, welfare and the environment.
- Prepare a conceptual design of the recommended alternative.
- Support future enforcement action under CERCLA.

The technical approach to completion of the RI/FS, which is described in Sections 4 and 5 of the Work Plan, contains 14 major technical elements, seven in the RI and seven in the FS:

- Study Area Survey
- Source Characterization
- Site Characterization
- Feasibility Study Testing
- Contaminant Pathway and Transport Evaluation
- Public Health Evaluation
- Remedial Investigation Report
- Preliminary Remedial Alternative Development
- Remedial Alternative Screening
- Remedial Alternative Analysis
- Comparative Evaluation of Acceptable Alternatives
- Feasibility Study Report
- EPA Decision Document Preparation Assistance
- Pre-Design (Conceptual Design) Report.

FIGURE 2-4 (continued)

SKINNER LANDFILL FEASIBILITY STUDY SCHEDULE

Week: 0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72

Work Plan Section	Task	Subtask	Activity	Deliverable	Week
5.1	1	-	Preliminary Remedial Alternative Development	Remedial Alternatives/ Technology Memorandum	XXOO
5.2	2	-	Remedial Alternative Screening	Alternative Screening Memorandum	XXXOO
5.3	3	-	Remedial Alternative Analysis	Alternative Analysis Memorandum	XXXOO
5.4	4	-	Comparative Evaluation of Acceptable Alternatives	Cost Effectiveness Analysis Memorandum	XXXXOO
5.5	5	-	Feasibility Study Report		
		1	Draft FS Report	Draft FS Report	XXXOOO
		2	Revised Draft FS Report	Revised Draft FS Report	XXXO
		3	Public Hearing		O
		4	Final FS Report	Final FS Report	XXXXOO
5.6	6	-	EPA Decision Document Preparation Assistance		
		1	PRP Negotiation Briefing	Negotiation Memo	XXXO
		2	EPA Decision Document	ROD	XXXXXXXX
		3	Summary of Alternatives	Summary of Remedial Alternatives	XXOO
5.7	7	-	Pre-Design Report	Pre-Design Report	XXXX
		1	Process Development		
		2	Conceptual Design	Conceptual Design	XXXXXXXOOOOO
		3	Preliminary Remediation Schedule	Schedule	XXOO
		4	Preliminary Specification Outline	Specification Outline	XXOO
		5	Conceptual Cost Estimate	Cost Estimate	XXOO
		6	COE Coordination		
5.8	8	-	Work Assignment Completion Report	Draft WACR	XXOO
5.9	9	-	Community Relations Support		

FIGURE 2-4

SKINNER LANDFILL REMEDIAL INVESTIGATION SCHEDULE

Work Plan Section	Task	Subtask	Activity	Deliverable	Week (0 4 8 12 16 20 24 28 32 36 40 44 48)
			Final Work Plan to U.S. EPA	Work Plan	X
			U.S. EPA Approval		●●●●
			Subcontract Procurement		XXXXX
4.1	1	-	Site Mobilization		X
4.2-4.4	2-4	-	Site Investigations		XXXXXXXXXX XX
		-	Technical Memos		XXXX
		-	Approved CRL/CLP Data		●●●● ●●●●
4.5	5	-	Bench Scale Testing		XX
4.6	6	-	Data Validation	Report	X X
4.7	7	-	Contaminant Transport and Pathway Evaluation		X
4.8	8	-	Endangerment Assessment		XXX
4.9	9	-	RI Report (Draft)	Report Draft	XXXXXXXXXXXXX
			NPMO Review		OO
		2	U.S.EPA Review		●●
			Review Meeting		●
		3	RI Report (Final)	Final Report	XX
4.11	11	-	Community Relations Support		AS APPROPRIATE
4.12	12	-	Quality Assurance	QA Audit Memos	X X X
4.13	13	-	Technical and Financial Management	Monthly Reports	X X X X X X X X X

X - Weston activity
O - REM II review
● - EPA Activity

2.5 SAMPLING NETWORK DESIGN

The objectives of the field program to be undertaken as part of the RI/FS at the Skinner Landfill site in West Chester, Ohio, are as follows:

- To determine the volume, characteristics and concentrations of hazardous materials in the buried lagoon.
- To evaluate the potential extent of buried drums in the area just north of the buried lagoon and the extent to which these drums are a source of hazardous contaminants.
- To determine if materials buried in the currently active landfill are releasing hazardous contaminants to surface water and/or groundwater.
- To inventory, collect, and characterize the nature of localized, potential sources (drums, tanks and surficial residues) that are scattered across the site.
- To characterize the potential for migration of hazardous contaminants by groundwater including:
  - assessing the depth and configuration of the bedrock surface
  - characterizing the stratigraphy of the site subsoils and near-surface rock formations
  - characterizing the hydrogeologic properties of the saturated subsoils and rock materials
  - determining the depth and configuration of the water table
  - evaluating groundwater flow directions and velocities, both horizontally and vertically.
- To characterize the potential for migration of hazardous contaminants by surface water including:
  - characterizing the relationship of groundwater and surface water bodies on-site
  - characterizing the amount and variation of stream discharge in the two streams on-site

- characterizing the amount and variation of suspended sediment transport in the two streams on-site.

o To identify potential receptors of contamination migration through groundwater pathways.

o To identify potential receptors of contamination migration through surface water pathways.

o To assess the extent of actual groundwater contamination from the lagoon, landfill, and other potential buried sources in the eastern part of the site.

o To screen for groundwater contamination from localized potential sources scattered across the site.

o To evaluate the quality of water utilized by private wells within one-half mile of the site with respect to Priority Pollutants and Primary Drinking Water Standards.

o To assess the extent of surface water and sediment contamination, if any, in the two streams and six ponds on and adjacent to the site.

o To evaluate the impacts of hazardous contaminants, if any, on aquatic receptors in the surface water bodies on and adjacent to the site.

The sampling (monitoring) network designed to achieve these objectives and the rationale for that design are presented in Section 2 of the Sampling and Analysis Plan, which is attached in Appendix B.

2.6 SAMPLE MATRICES/PARAMETERS/FREQUENCY

The scope of the sampling activities planned at the Skinner Landfill site include the installation of 30 groundwater monitoring wells, the drilling of five sampled soil borings, the excavation of six sampled test pits, and the collection and analysis of 307 environmental samples. The media/matrices to be sampled include waste, soil, groundwater, surface water, and sediment.

Chemical analysis for the HSL parameters and additional pesticides listed in Tables 2-2 and 2-3 will be performed on 241 samples, of which 197 will be investigative, 14 will be duplicates, and 14 will be field blanks. The CRL may also report other ICP metals if determined. Geotechnical index properties will be determined for 66 samples to characterize on-site soil materials. The sampling and analysis

TABLE 2-2

HAZARDOUS SUBSTANCE LIST PARAMETERS

VOLATILES

Chloromethane
Bromomethane
Vinyl Chloride
Chloroethane
Methylene Chloride
Acetone
Carbon Disulfide
1,1-Dichloroethene
1,1-Dichloroethane
trans-1,2-Dichloroethene
Chloroform
1,2-Dichloroethane
2-Butanone
1,1,1-Trichloroethane
Carbon Tetrachloride
Vinyl Acetate
Bromodichloromethane
1,1,2,2-Tetrachloroethane
1,2-Dichloropropane
trans-1,3-Dichloropropene
Trichloroethene
Dibromochloromethane
1,1,2-Trichloroethane
Benzene
cis-1,3-Dichloropropene
2-Chlorothyl Vinyl Ether
Bromoform
2-Hexanone
4-Methyl-2-pentanone
Tetrachloroethene
Toluene
Chlorobenzene
Ethyl Benzene
Styrene
Total Xylenes

SEMI-VOLATILES

Acenaphthylene
Acenaphthene
bis-(2-Chloroethyl) ether
2-Chlorophenol
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Benzyl Alcohol
1,2-Dichlorobenzene
2-Methylphenol
bis-(2-Chloroisopropyl) ether
4-Methylphenol
N-Nitroso-Dipropylamine
Hexachloroethane
Nitrobenzene
Isophorone
2-Nitrophenol
2,4-Dimethylphenol
Benzoic Acid
bis-(2-Chloroethoxy) methane
Pyrene
Phenol
3-Nitroaniline
2,4-Dinitrophenol
4-Nitrophenol
Dibenzofuran
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Diethylphthalate
4-Chlorophenyl Phenyl ether
Fluorene
4-Nitroaniline
4,6-Dinitro-2-methylphenol
N-nitrosodiphenylamine
4-Bromophenyl Phenyl ether
Hexachlorobenzene
Pentachlorophenol
Anthracene
Di-n-butylphthalate
Fluoranthene
2,4-Dichlorophenol

program is summarized in Table 2-4, which indicates the specific parameters to be measured, the number and frequency of sampling, and the level of QA effort for each sample medium/matrix.

SEMI-VOLATILES

1,2,4-Trichlorobenzene
Naphthalene
4-Chloroaniline
Hexachlorobutadiene
4-Chloro-3-methylphenol
(para-chloro-meta-cresol)
2-Methylnaphthalene
Hexachlorocyclopentadiene
2,4,6-Trichlorophenol
2,4,5-Trichlorophenol
2-Chloronaphthalene
2-Nitroaniline
Dimethyl Phthalate
Butyl Benzyl Phthalate
3,3'-Dichlorobenzidine
Benzo(s)anthracene
bis(2-ethylhexyl)phthalate
Chrysene
Di-n-octyl Phthalate
Benzo(b)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3-cd)pyrene
Dibenz(a,h)anthracene
Benzo(g,h,i)perylene

PESTICIDES

alpha-BHC
beta-BHC
delta-BHC
gamma-BHC (lindane)
Heptachlor
Aldrin
Heptachlor Epoxide
Endosulfan I
Dieldrin
4,4'-DDE
Endrin
Endosulfan II
4,4'-DDD
Endrin Aldehyde
Endosulfan Sulfate
4,4'-DDT
Endrin Ketone
Methoxychlor
Chlordane
Toxaphene
AROCLOR-1016
AROCLOR-1221
AROCLOR-1232
AROCLOR-1242
AROCLOR-1248
AROCLOR-1254
AROCLOR-1260

INORGANICS

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Cyanide
Manganese
Mercury
Nickel
Potassium
Selenium
Silver
Sodium
Thallium
Magnesium
Vanadium
Zinc

SEMI-VOLATILES

1,2,4-Trichlorobenzene
Naphthalene
4-Chloroaniline
Hexachlorobutadiene
4-Chloro-3-methylphenol
(para-chloro-meta-cresol)
2-Methylnaphthalene
Hexachlorocyclopentadiene
2,4,6-Trichlorophenol
2,4,5-Trichlorophenol
2-Chloronaphthalene
2-Nitroaniline
Dimethyl Phthalate
Butyl Benzyl Phthalate
3,3'-Dichlorobenzidine
Benzo(s)anthracene
bis(2-ethylhexyl)phthalat
Chrysene
Di-n-octyl Phthalate
Benzo(b)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3-cd)pyrene
Dibenz(a,h)anthracene
Benzo(g,h,i)perylene

PESTICIDES

alpha-BHC
beta-BHC
delta-BHC
gamma-BHC (lindane)
Heptachlor
Aldrin
Heptachlor Epoxide
Endosulfan I
Dieldrin
4,4'-DDE
Endrin
Endosulfan II
4,4'-DDD
Endrin Aldehyde
Endosulfan Sulfate
4,4'-DDT
Endrin Ketone
Methoxychlor
Chlordane
Toxaphene
AROCLOR-1016
AROCLOR-1221
AROCLOR-1232
AROCLOR-1242
AROCLOR-1248
AROCLOR-1254
AROCLOR-1260

INORGANICS

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Cyanide
Manganese
Mercury
Nickel
Potassium
Selenium
Silver
Sodium
Thallium
~~Tin~~
Vanadium
Zinc
Magnesium

TABLE 2-3

ADDITIONAL PESTICIDE PARAMETERS

Octachlorocyclopentene
Hexachloronorboradiene
Heptachloronorborene
Chlordene

TABLE 2-3

ADDITIONAL PESTICIDE PARAMETERS

Octachlorocyclopentene
~~Hexachlorocyclopentadiene (C-56)~~
Hexachloronorboradiene
Heptachloronorborene
Chlordene

TABLE 2-4

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Samples No.	Investigative Samples Freq.	Investigative Samples Total	QA Samples Duplicate No.	Duplicate Freq.	Duplicate Total	Blank No.	Blank Freq.	Blank Total	Matrix Total
Soil-Boring (Medium)	Qualitative organic vapor screening with OVA and/or HNu	SAS organics package including 30 tentatively identified parameters	10	1	10	1	1	1	1	1	1	12
		RAS inorganics/metals package from CLP	10	1	10	1	1	1	1	1	1	12
		SAS for additional pesticides	10	1	10	1	1	1	1	1	1	12
Waste-Boring (High)	Qualitative organic vapor screening with OVA and/or HNu	SAS organics package including 30 tentatively identified parameters	15	1	15	2	1	2	2	1	2	19
		SAS inorganics/metals package	15	1	15	2	1	2	2	1	2	19
		SAS for additional pesticides	15	1	15	2	1	2	2	1	2	19
Soil-Test Pit (Medium)	Qualitative organic vapor screening with OVA and/or HNu	SAS organics package including 30 tentatively identified parameters	12	1	12	1	1	1	1	1	1	14
		RAS inorganics/metals package from CLP	12	1	12	1	1	1	1	1	1	14
		SAS for additional pesticides	12	1	12	1	1	1	1	1	1	14

Notes: Field parameters determined for investigative and duplicate samples only.

Samples shown as blanks for solid media are matrix spikes.

TABLE 2-4 (cont.)

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Samples No.	Investigative Samples Freq.	Investigative Samples Total	QA Samples Duplicate No.	Duplicate Freq.	Duplicate Total	Blank No.	Blank Freq.	Blank Total	Matrix Total
Waste-Test Pit (High)	Qualitative organic vapor screening with OVA and/or HNu	SAS organics package including 30 tentatively identified parameters	18	1	18	2	1	2	2	1	2	22
		SAS inorganics/metals package	18	1	18	2	1	2	2	1	2	22
		SAS for additional pesticides	18	1	18	2	1	2	2	1	2	22
Soil-Surface (Medium)	Qualitative organic vapor screening with OVA and/or HNu	SAS organics package including 30 tentatively identified parameters	20	1	20	2	1	2	2	1	2	24
		RAS inorganics/metals package from CLP	20	1	20	2	1	2	2	1	2	24
Soil-Wells	Qualitative organic vapor screening with OVA and/or HNu	Atterberg Limits (ASTM D 4318-83)	20	1	20	2	1	2	0	0	0	22
		Particle size analysis (ASTM D 422-63) sieve analysis	20	1	20	2	1	2	0	0	0	22
		Particle size analysis (ASTM D 422-63)	20	1	20	2	1	2	0	0	0	22

Notes: Field parameters determined for investigative and duplicate samples only.

Samples shown as blanks for solid media are matrix spikes.

ASTM methods can be found in American Society of Testing and Materials 1984 Annual Book of Standards, Volume 4.08, Soil and Rock; Building Stones, pgs. 750-765 and pgs. 116-126 respctively. Laboratory testing to be performed by a qualified geotechnical laboratory.

TABLE 2-4 (cont.)

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Samples No.	Investigative Samples Freq.	Investigative Samples Total	QA Samples Duplicate No.	Duplicate Freq.	Duplicate Total	QA Samples Blank No.	Blank Freq.	Blank Total	Matrix Total
Surface Water (Low)	pH	RAS organics package from CLP including 30 tentatively identified parameters	16	1	16	2	1	2	2	1	2	20
	Specific conductance											
	Temperature	RAS inorganics/metals package from CLP unfiltered samples	16	1	16	2	1	2	2	1	2	20
		SAS for total supended solids	7	2	14	1	2	2	1	2	2	18
Sediment (Low)	Qualitative organic vapor screening with OVA and/or HNu	RAS organics package from CLP including 30 tentatively identified parameters	16	1	16	2	1	2	2	1	2	20
		RAS inorganics/metals package from CLP	16	1	16	2	1	2	2	1	2	20
Off-Site Soil (Low)	Qualitative organic vapor screening with OVA and/or HNu	RAS organics package from CLP including 30 tentatively identified parameters	3	1	3	0	0	0	0	0	0	3
		RAS inorganics/metals package from CLP	3	1	3	0	0	0	0	0	0	3
Drum-Residue (High)	Qualitative organic vapor screening with OVA and/or HNu	SAS organics package including 30 tentatively identified parameters	20	1	20	2	1	2	2	1	2	24
		SAS inorganics/metals package	20	1	20	2	1	2	2	1	2	24

Notes: Field parameters determined for investigative and duplicate samples only.

Samples shown as blanks for solid media are matrix spikes.

Only open drums or drums with askew lids will be sampled.

TABLE 2-4 (cont.)

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Samples No.	Investigative Samples Freq.	Investigative Samples Total	QA Samples Duplicate No.	QA Samples Duplicate Freq.	QA Samples Duplicate Total	QA Samples Blank No.	QA Samples Blank Freq.	QA Samples Blank Total	Matrix Total
Groundwater (Low)	pH	RAS organics package from CLP including 30 tentatively identified parameters	30	2	60	3	2	6	3	2	6	72
	Specific conductance	RAS inorganics/metals package from CLP filtered samples	30	2	60	3	2	6	3	2	6	72
	Temperature	RAS inorganics/metals package & SAS for suspended solids - unfiltered samples	6	1	6	1	1	1	1	1	1	8
Private Wells (Low)	pH	HSL Acid extractables and base/neutral extractables from CRL	10	1	10	1	1	1	1	1	1	12
	Specific conductance	HSL Pesticides and PCBs from CRL	10	1	10	1	1	1	1	1	1	12
	Temperature	SAS for Additional pesticides	10	1	10	1	1	1	1	1	1	12
		HSL Volatile organics from CRL	10	1	10	1	1	1	1	1	1	12
		HSL Metals and major cations (Ca,Mg,Na,K) from CRL--unfiltered samples	10	1	10	1	1	1	1	1	1	12
		Cyanide from CRL -- unfiltered samples	10	1	10	1	1	1	1	1	1	12
		Minerals from CRL (alkalinity, chloride, sulfate)	10	1	10	1	1	1	1	1	1	12
		Nutrients from CRL (ammonia, nitrate-nitrite)	10	1	10	1	1	1	1	1	1	12

Notes: Field parameters determined for investigative and duplicate samples only.

Samples shown as blanks for solid media are matrix spikes.

SECTION 3

PROJECT ORGANIZATION AND RESPONSIBLITY

Camp Dresser & McKee (CDM), as prime contractor, has overall responsibility for all phases of the RI/FS at the Skinner Landfill site. Roy F. Weston, Inc. (Weston) is a REM II subcontractor to CDM. Weston will perform the field investigations and prepare the RI report. Weston will also perform the development, screening and evaluation of remedial action alternatives; develop the conceptual design of the selected action; and prepare the related reports. CDM will provide administrative oversight and QA/QC for all deliverables. Clement Associates, Inc. and ICF, Inc., which are also REM II subcontractors to CDM, will provide specialty services in the areas of risk assessment and community relations respectively. All four firms will provide project management as appropriate to their responsibilities. All deliverables will be issued by CDM.

3.1 OPERATIONAL RESPONSIBILITY

Operational responsibilities are those involving execution and direct management of the technical and administrative aspects of this project. The following responsibilities have been assigned for the RI/FS at Skinner Landfill:

- Remedial Project Manager (RPM)
  Gene Wong, U.S. EPA, Region V, ERRB

- REM II Region V Manager
  John W. Hawthorne, REM II, CDM

- Site Manager
  R. Michael Bort, P.E., REM II, Weston

- Field Manager
  Mark Hutson, REM II, Weston

- Principal Investigator RI
  Mark Hutson, REM II, Weston

- Principal Investigator FS
  R. Michael Bort, P.E., REM II, Weston

- Principal Investigator Conceptual Design
  John W. Thorsen, P.E., REM II, Weston

- o Principal Investigator Risk Assessment
  Dr. Ian T. Nesbit, REM II, Clement Assoc.

- o Community Relations
  Margaret McCue, U.S. EPA, Region V

- o Community Relations Support
  Carol Andress, REM II, ICF

3.2 LABORATORY RESPONSIBLITIES

Laboratory responsiblities are those involving the performance of analytical services, the preparation of Special Analytical Services (SAS) requests and/or field laboratory procedures, and the assessment of analytical data including review of tentatively identified compounds. The following responsibilities have been assigned for the RI/FS at Skinner Landfill:

- o RAS and SAS from Contract Laboratory Program
  Charles T. Elly, U.S. EPA, Region V, CPSM-CRL

- o Analysis of Private Well Samples
  Central Regional Laboratory
  Curtis Ross, U.S. EPA, Region V, CRL-Director

- o Geotechnical Laboratory
  Unassigned

- o Preparation of SAS Requests
  Earl Hanson, REM II, Weston

- o Data Assessment for RAS and SAS from CLP
  Contract Program Management Section, CRL

- o Data Assessment of Analytical Services from CRL
  QC Coordinator, CRL

- o Data Assessment for Geotechnical Laboratory
  Edward A. Need, REM II, Weston

- o Review of Tentatively Identified Compounds
  Earl Hanson, REM II, Weston
  Mark Hutson, REM II, Weston

3.3 QA RESPONSIBILITY

Quality Assurance (QA) responsibilities are those involved with monitoring and reviewing the procedures used to perform all aspects of this project including data collection, analytical services, and report preparation. Primary responsibility for project quality rests with the Site Manager. Ultimate responsibility for project quality rests with CDM. Prior to any QA review by CDM, any work performed by the REM II subcontract firms--Weston, Clement Associates and ICF--will be reviewed by the QA Reviewer for that firm. Specific QA responsibilities for the RI/FS at Skinner Landfill have been assigned as follows:

- Overall QA for REM II Activities
  John W. Hawthorne, REM II, CDM

- Overall QA for CLP/CRL Activities
  Quality Assurance Office, U.S. EPA, Region V

- QA for Field Activities
  David Horsefield, REM II, Weston

- QA for RAS from CLP
  Support Services Branch, OERR, EPA HQ
  EMSL Las Vegas
  Contract Program Management Section, CRL

- QA for SAS from CLP
  Quality Assurance Office, U.S. EPA, Region V

- QA for Analytical Services from CRL
  Quality Assurance Office, U.S. EPA, Region V
  QC Coordinator, CRL

- Performance and Systems Audits of RAS from CLP
  U.S. EPA, EMSL-Las Vegas

- Performance and Systems Audits of CRL
  Quality Assurance Office, U.S. EPA, Region V
  QC Coordinator, CRL

- Systems Audit of Field Activities
  Edward A. Need, REM II, Weston

- Systems Audit of Geotechnical Laboratory
  Edward A. Need, REM II, Weston

- CDM QA Review
  David Horsefield, P.E., REM II, CDM
  National Program Management Office, REM II, CDM

- Weston QA Review
  Glen Johnson, REM II, Weston
- Clement Associates QA Review
  Jay Turim, REM II, Clement
- ICF QA Review
  Marian Cox, REM II, ICF
- QA/QC Summaries for Revised RI and FS/CD Reports
  Kurt Stimpson, REM II, Weston

SECTION 4

QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective is to develop and implement procedures for field sampling, chain of custody, laboratory analysis and reporting that will provide legally defensible results in a court of law. Specific procedures to be used for sampling, chain of custody, calibration, laboratory analysis, reporting, internal quality control, audits, preventative maintenance and corrective actions are described in other sections of this Quality Assurance Project Plan. This section defines the goals for level of QA effort; accuracy, precision and sensitivity of analyses; and completeness, representativeness, and comparability of measurement data from all analytical laboratories. QA objectives for field measurements are also discussed.

4.1 REGULATORY AND LEGAL REQUIREMENTS

There are no special regulatory or legal requirements in that compliance with regulations or laws other than CERCLA is not an objective or issue at this site.

4.2 LEVEL OF QA EFFORT

Field duplicates and field blanks will be taken and submitted to the analytical laboratories to provide the means to assess the quality of the data resulting from the field sampling program. Duplicate samples are analyzed to check for sampling and analytical reproductibility. Blank samples will be analyzed to check for procedural contamination and/or ambient conditions at the site which are causing sample contamination. The general level of this QA effort will be one field duplicate and one field blank for every 10 investigative samples. Soil samples selected for geotechnical testing will include one field duplicate for each analysis being performed but no blanks. The specific level of field QA effort for the Skinner Landfill RI/FS, itemized by sample matrix and parameter, is shown in Table 2-4.

The waste, soil, groundwater, surface water, sediment and biological samples collected at the site will be analyzed using the Contract Laboratory Program (CLP). The level of laboratory QA effort for Routine Analytical Services (RAS) provided by the CLP is specified in the Statements of Work (SOWs) WA85-J664/J680 for organics and WA85-J838/J839 for inorganics. Extracts of high hazard samples to tested by SAS for the RAS organics and inorganics parameters will u the same level of QA effort. Samples collected from private wells will be analyzed at the Central Regional Laboratory (CRL). A typic level of laboratory QA for the CRL is summarized in Table 4-1 for information purposes. This level of effort is subject to change periodically. The level of laboratory QA effort for SAS of additio pesticides and total suspended solids are described in the individu SAS request forms which are attached in Appendix C.

Laboratory QA for the geotechnical testing will require that all equipment used to perform the analyses be calibrated not more than 6 months prior to actual testing, that all solutions be not more than 1 month old, and that all calculations be checked by someone other than the person performing the actual testing. The geotechnical laborator will also be required to test one laboratory duplicate for each type of analysis, that is, to repeat some tests using the same material used for the initial testing of that sample.

4.3 ACCURACY, PRECISION, AND SENSITIVITY OF ANALYSES

The fundamental QA objective with respect to accuracy, precision, and sensitivity of laboratory analytical data is to achieve the QC acceptance criteria of the analytical protocols. The accuracy and precision requirements for RAS from the CLP are specified in SOWs, WA85-J664/J680 for organics and WA85-J838/J839 for inorganics. The sensitivities required for CLP analyses will be the method detection limits, shown in Tables 4-2 and 4-3, from the same SOWs. Extracts of high hazard samples to be tested by SAS for RAS organics and inorganics parameters will use the same accuracy, precision and sensitivity criteria.

Typical accuracy and precision criteria for analytical services from the CRL for organics and inorganics are shown in Tables 4-4, 4-5 and 4-6, respectively, for information purposes. This level of effort is subject to change periodically. The QC control limits should be completely met without any outliers. If an out-of-control result occurs and the QC Coordinator of the CRL does not believe it necessary to rerun the sample, the result will be flagged and a memorandum written regarding the utility of the data. The sensitivities required for CRL analyses are the CLP method detection limits shown in Tables 4-7 and 4-8. The accuracy and precision requirements for SAS of additional pesticides and total suspended solids are described in the individual SAS request forms which are attached in Appendix C. The requested detection limits for additional pesticides to be analyzed by the CRL are indicated in Table 4-7. All compounds will be analyzed initially by GC/EC. Any samples where compounds are found in quantities greater than the requested detection limit for the GC/MS method should then be analyzed using GC/MS.

TABLE 4-1
QC LEVEL OF EFFORT FOR CRL ANALYTICAL SERVICES

Parameter	Lab Blanks	Spikes or Surrogates/Spikes	Lab Duplicates	Matrix Spike Duplicate
Base/Neutral/Acid Compounds	One per set of samples or a minimum of 1 in 10	Surrogates added to each sample and matrix spikes added to one sample per set	NR	One per set of samples or a minimum of 1 in 10
Volatiles	One per day or 8-hour shift	Surrogates added to each sample and matrix spikes added to one sample per set	NR	One per set of samples or a minimum of 1 in 10
Pesticides and PCBs	One per set of samples or a minimum of 1 in 10	One spike per set of samples or a minimum of 1 in 10	One per set of samples or a minimum of 1 in 10	One per set of samples or a minimum of 1 in 10
Metals	One per 10 samples	One per 10 samples	One per 10 samples	NA
Cyanide	One per analytical run or at least one per set-up	One per analytical run or at least one per set-up	One per analytical run or at least one per set-up	NA
Mercury	One per 20 samples	Not Applicable	One per 20 samples	NA
Alkalinity	One at beginning, one at end and one per 20 samples	Not Applicable	One per 20 samples	NA
Chloride	One at beginning, one at end, and one per 40 samples	One per 40 samples	One per 10 samples	NA
Sulfide	One at beginning, one at end, and one per 20 samples	One per 20 samples	One per 10 samples	NA
Sulfate	One at beginning, one at end, and one per 40 samples	One per 40 samples	One per 40 samples	NA
Ammonia Nitrogen	One at beginning, one at end, and one per 40 samples	One spike per set of samples or at least one per 40 samples	One per set of samples or at least one per 40 samples	NA
Nitrate and Nitrite	One at beginning, one at end, and one per 40 samples	One spike per set of samples or at least one per 40 samples	One per set of samples or at least one per 40 samples	NA

TABLE 4-1 (Contd.)
QC LEVEL OF EFFORT FOR CRL ANALYTICAL SERVICES

Parameter	Lab Blanks	Spikes or Surrogates/Spikes	Lab Duplicates	Matrix Spike Duplicate
Suspended Solids	One per 20 samples	Not Applicable	One per 20 samples	NA
Total Dissolved Solids	One per 20 samples	Not Applicable	One per 20 samples	NA

TABLE 4-2

Method Detection Limits for
RAS Organics from CLP

Volatiles	CAS Number	Detection Limits* Low Water[a] ug/L	Low Soil/Sediment[b] ug/Kg
1. Chloromethane	74-87-3	10	10
2. Bromomethane	74-83-9	10	10
3. Vinyl Chloride	75-01-4	10	10
4. Chloroethane	75-00-3	10	10
5. Methylene Chloride	75-09-2	5	5
6. Acetone	67-64-1	10	10
7. Carbon Disulfide	75-15-0	5	5
8. 1,1-Dichloroethene	75-35-4	5	5
9. 1,1-Dichloroethane	75-35-3	5	5
10. trans-1,2-Dichloroethene	156-60-5	5	5
11. Chloroform	67-66-3	5	5
12. 1,2-Dichloroethane	107-06-2	5	5
13. 2-Butanone	78-93-3	10	10
14. 1,1,1-Trichloroethane	71-55-6	5	5
15. Carbon Tetrachloride	56-23-5	5	5
16. Vinyl Acetate	108-05-4	10	10
17. Bromodichloromethane	75-27-4	5	5
18. 1,1,2,2-Tetrachloroethane	79-34-5	5	5
19. 1,2-Dichloropropane	78-87-5	5	5
20. trans-1,3-Dichloropropene	10061-02-6	5	5
21. Trichloroethene	79-01-6	5	5
22. Dibromochloromethane	124-48-1	5	5
23. 1,1,2-Trichloroethane	79-00-5	5	5
24. Benzene	71-43-2	5	5
25. cis-1,3-Dichloropropene	10061-01-5	5	5

TABLE 4-2 (Contd.)

Volatiles	CAS Number	Detection Limits* Low Water[a] ug/L	Low Soil/Sediment[b] ug/Kg
26. 2-Chloroethyl Vinyl Ether	110-75-8	10	10
27. Bromoform	75-25-2	5	5
28. 2-Hexanone	591-78-6	10	10
29. 4-Methyl-2-pentanone	108-10-1	10	10
30. Tetrachloroethene	127-18-4	5	5
31. Toluene	108-88-3	5	5
32. Chlorobenzene	108-90-7	5	5
33. Ethyl Benzene	100-41-4	5	5
34. Styrene	100-42-5	5	5
35. Total Xylenes		5	5

[a]Medium Water Contract Required Detection Limits (CRDL) for Volatile HSL Compounds are 100 times the individual Low Water CRDL.

[b]Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Volatile HSL Compounds are 100 times the individual Low Soil/Sediment CRDL.

TABLE 4-2 (Contd.)

Semi-Volatiles	CAS Number	Detection Limits* Low Water[c] ug/L	Low Soil/Sediment[d] ug/Kg
36. Phenol	108-95-2	10	330
37. bis(2-Chloroethyl) ether	111-44-4	10	330
38. 2-Chlorophenol	95-57-8	10	330
39. 1,3-Dichlorobenzene	541-73-1	10	330
40. 1,4-Dichlorobenzene	106-46-7	10	330
41. Benzyl Alcohol	100-51-6	10	330
42. 1,2-Dichlorobenzene	95-50-1	10	330
43. 2-Methylphenol	95-48-7	10	330
44. bis(2-Chloroisopropyl) ether	39638-32-9	10	330
45. 4-Methylphenol	106-44-5	10	330
46. N-Nitroso-Dipropylamine	621-64-7	10	330
47. Hexachloroethane	67-72-1	10	330
48. Nitrobenzene	98-95-3	10	330
49. Isophorone	78-59-1	10	330
50. 2-Nitrophenol	88-75-5	10	330
51. 2,4-Dimethylphenol	105-67-9	10	330
52. Benzoic Acid	65-85-0	50	1600
53. bis(2-Chloroethoxy) methane	111-91-1	10	330
54 2,4-Dichlorophenol	120-83-2	10	330
55. 1,2,4-Trichlorobenzene	120-82-1	10	330
56. Naphthalene	91-20-3	10	330
57. 4-Chloroaniline	106-47-8	10	330
58. Hexachlorobutadiene	87-68-3	10	330
59. 4-Chloro-3-methylphenol (para-chloro-meta-cresol)	59-50-7	10	330
60. 2-Methylnaphthalene	91-57-6	10	330
61. Hexachlorocyclopentadiene	77-47-4	10	330
62. 2,4,6-Trichlorophenol	88-06-2	10	330
63. 2,4,5-Trichlorophenol	95-95-4	50	1600

TABLE 4-2 (Contd.)

Semi-Volatiles	CAS Number	Detection Limits* Low Water[c] ug/L	Low Soil/Sediment[c] ug/Kg
64. 2-Chloronaphthalene	91-58-7	10	330
65. 2-Nitroaniline	88-74-4	50	1600
66. Dimethyl Phthalate	131-11-3	10	330
67. Acenaphthylene	208-96-8	10	330
68. 3-Nitroaniline	99-09-2	50	1600
69. Acenaphthene	83-32-9	10	330
70. 2,4-Dinitrophenol	51-28-5	50	1600
71. 4-Nitrophenol	100-02-7	50	1600
72. Dibenzofuran	132-64-9	10	330
73. 2,4-Dinitrotoluene	121-14-2	10	330
74. 2,6-Dinitrotoluene	606-20-2	10	330
75. Diethylphthalate	84-66-2	10	330
76. 4-Chlorophenyl Phenyl ether	7005-72-3	10	330
77. Fluorene	86-73-7	10	330
78. 4-Nitroaniline	100-01-6	50	1600
79. 4,6-Dinitro-2-methylphenol	534-52-1	50	1600
80. N-nitrosodiphenylamine	86-30-6	10	330
81. 4-Bromophenyl Phenyl ether	101-55-3	10	330
82. Hexachlorobenzene	118-74-1	10	330
83. Pentachlorophenol	87-86-5	50	1600
84. Phenanthrene	85-01-8	10	330
85. Anthracene	120-12-7	10	330
86. Di-n-butylphthalate	84-74-2	10	330
87. Fluoranthene	206-44-0	10	330
88. Pyrene	129-00-0	10	330
89. Butyl Benzyl Phthalate	85-68-7	10	330
90. 3,3'-Dichlorobenzidine	91-94-1	20	660
91. Benzo(a)anthracene	56-55-3	10	330
92. bis(2-ethylhexyl)phthalate	117-81-7	10	330
93. Chrysene	218-01-9	10	330
94. Di-n-octyl Phthalate	117-84-0	10	330
95. Benzo(b)fluoranthene	205-99-2	10	330
96. Benzo(k)fluoranthene	207-08-9	10	330
97. Benzo(a)pyrene	50-32-8	10	330

TABLE 4-2 (Contd.)

Semi-Volatiles	CAS Number	Detection Limits* Low Water[c] ug/L	Low Soil/Sediment[d] ug/Kg
98. Indeno(1,2,3-cd)pyrene	193-39-5	10	330
99. Dibenz(a,h)anthracene	53-70-3	10	330
100. Benzo(g,h,i)perylene	191-24-2	10	330

[c]Medium Water Contract Required Detection Limits (CRDL) for Semi-Volatile HSL Compounds are 100 times the individual Low Water CRDL.

[d]Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Semi-Volatile HSL Compounds are 60 times the individual Low Soil/Sediment CRDL.

TABLE 4-2 (Contd.)

Pesticides	CAS Number	Detection Limits* Low Water[e] ug/L	Low Soil/Sediment[f] ug/Kg
101. alpha-BHC	319-84-6	0.05	8.0
102. beta-BHC	319-85-7	0.05	8.0
103. delta-BHC	319-86-8	0.05	8.0
104. gamma-BHC (Lindane)	58-89-9	0.05	8.0
105. Heptachlor	76-44-8	0.05	8.0
106. Aldrin	309-00-2	0.05	8.0
107. Heptachlor Epoxide	1024-57-3	0.05	8.0
108. Endosulfan I	959-98-8	0.05	8.0
109. Dieldrin	60-57-1	0.10	16.0
110. 4,4'-DDE	72-55-9	0.10	16.0
111. Endrin	72-20-8	0.10	16.0
112. Endosulfan II	33213-65-9	0.10	16.0
113. 4,4'-DDD	72-54-8	0.10	16.0
114. Endosulfan Sulfate	1031-07-8	0.10	16.0
115. 4,4'-DDT	50-29-3	0.10	16.0
116. Endrin Ketone	53494-70-5	0.10	16.0
117. Methoxychlor	72-43-5	0.5	80.0
118. Chlordane	57-74-9	0.5	80.0
119. Toxaphene	8001-35-2	1.0	160.0
120. AROCLOR-1016	12674-11-2	0.5	80.0
121. AROCLOR-1221	11104-28-2	0.5	80.0
122. AROCLOR-1232	11141-16-5	0.5	80.0
123. AROCLOR-1242	53469-21-9	0.5	80.0
124. AROCLOR-1248	12672-29-6	0.5	80.0
125. AROCLOR-1254	11097-69-1	1.0	160.0
126. AROCLOR-1260	11096-82-5	1.0	160.0

[e] Medium Water Contract Required Detection Limits (CRDL) for Pesticide HSL Compounds are 100 times the individual Low Water CRDL.

[f] Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Pesticide HSL compounds are 15 times the individual Low Soil/Sediment CRDL.

*Detection limits listed for soil/sediment are based on wet weight. The detection limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, as required by the contract, will be higher.

** Specific detection limits are highly matrix dependent. The detection limits listed herein are provided for guidance and may not always be achievable.

TABLE 4-3
Detection Limits for RAS
Inorganics from CLP

Element	Contract Required Detection Level[1,2] (ug/L)
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5000
Chromium	10
Cobalt	50
Copper	25
Iron	100
Lead	5
Magnesium	5000
Manganese	15
Mercury	0.2
Nickel	40
Potassium	5000
Selenium	5
Silver	10
Sodium	5000
Thallium	10
Vanadium	50
Zinc	20
Cyanide	10

1: Any analytical method specified in SOW Exhibit D may be utilized as long as the documented instrument or method detection limits meet the Contract Required Detection Level (CRDL) requirements. Higher detection levels may only be used in the following circumstance:

If the sample concentration exceeds two times the detection limit of the instrument or method in use, the value may be reported even though the instrument or method detection limit may not equal the contract required detection level. This is illustrated in the example below:

- For lead:
  Method in use = ICP
  Instrument Detection Limit (IDL) = 40
  Sample concentration = 85
  Contract Required Detection Level (CRDL).= 5

The value of 85 may be reported even though instrument detection limit is greater than required detection level. The instrument or method detection limit must be documented as described in Exhibit E.

2: These CRDL are the instrument detection limits obtained in pure water that must be met using the procedure in Exhibit E. The detection limits for samples may be considerably higher depending on the sample matrix.

TABLE 4-4

ACCURACY AND PRECISION CRITERIA FOR ORGANICS FROM CRL

ALL UNITS ARE MICROGRAMS/LITER

PARAMETER	AUDIT	COMPOUNDS	SPIKE LEVEL (ug/l)	CONTROL LIMITS*
VOLATILES	LAB BLANK	--	--	< DETECTION LIMIT EXCEPT FOR: METHYLENE CHLORIDE TOLUENE ACETONE 5 X D.L.
	MATRIX SPIKE DUPLICATE PRECISION	--	--	< 22% RPD
	SURROGATE SPIKE RECOVERY	1,2-DICHLOROETHANE-D_4	10	8-12 (ug/l)
		BENZENE-D6	10	8-12 (ug/l)
		TOLUENE-D8	10	8-12 (ug/l)
	CONTROL STANDARD SPIKED WITH A ROTATING MIXTURE OF 10 TO 12 STANDARDS	SEE METHOD DETECTION LIMIT TABLE FOR VOLATILE COMPOUNDS		WILL VARY FOR EACH SET OF SAMPLES
ACID/BASE/ NEUTRAL COMPOUNDS	METHOD BLANK	--	--	< 2 TIMES DETECTION LIMIT
	MATRIX SPIKE DUPLICATE PRECISION	--	--	< 38% RPD
	SURROGATE SPIKE RECOVERY	2-FLOUROPHENOL	100	43-166%
		PHENOL-D_5	100	10-94%
		NITROBENZENE-D_5	100	35-114%
		2-FLOUROBIPHENYL	100	43-116%
		2,4,,6-TRIBROMOPHENOL	100	10-123%
		p-TERPHENYL-D_{14}	100	33-141%
	MATRIX SPIKE RECOVERY	PHENOL	100	10-100% FOR ALL COMPOUNDS
		2-CHLOROPHENOL	100	
		1,3-DICHLOROBENZENE	100	
		1,4-DICHLOROBENZENE	100	
		BENZYL ALCOHOL	100	
		N-NITROSODIPROPYLAMINE	100	
		1,2,4-TRICHLOROBENZENE	100	
		4-CHLOROANILINE	100	
		4-CHLORO-3-METHYLPHENOL	100	

* IN REAGENT WATER

TABLE 4-4 (Contd.)

ACCURACY AND PRECISION CRITERIA FOR ORGANICS FROM CRL (Continued)

ALL UNITS ARE MICROGRAMS/LITER

PARAMETER	AUDIT	COMPOUNDS	SPIKE LEVEL (ug/l)	CONTROL LIMITS*
	MATRIX SPIKE RECOVERY (CONTINUED)	2,6-DINITROTOUENE	100	
		ACENAPHTHENE	100	
		DIBENZOFURAN	100	
		2,4-DINITROTOLUENEE	100	
		4-NITROPHENOL	100	
		PENTACHLOROPHENOL	100	
		DI-n-BUTYL-PHTHALATE	100	
		PYRENE	100	
PCBs-PESTICIDES	LAB BLANK	--	--	< DETECTION LIMIT
	LAB DUPLICATE	--	--	< 35% RPD
	SURROGATE SPIKE RECOVERY	DIBUTYL CHLORENDATE	0.7	75-125%
	MATRIX SPIKE RECOVERY	ALDRIN	5	3-6 (ug/l)
		LINDANE	2	1-4 (ug/l)
		4,4'-DDT	15	10-18 (ug/l)
		DIELDRIN	5	3-6 (ug/l)
		ENDOSULFAN I	6	4-7 (ug/l)
		ENDRIN	10	6-12 (ug/l)
		HEPTACHLOR	2	1-4 (ug/l)
		4,4'-METHOXYCHLOR	20	15-28 (ug/l)
		ARCLOR 1242	3	2-6 (ug/l)

* IN REAGENT WATER

TABLE 4-5

ACCURACY AND PRECISION FOR ICP METALS FROM CRL

An undigested control standard will be analyzed at the beginning and end of each run to evaluate instrument performance. A digested acidified reagent water laboratory blank will be analyzed with each run to check the system for contaminants and interferences. The control limits for these audits for each parameter are presented below:

Parameter	Control Limits for Control Standards	Control Standard Concentration	Control Standards for Laboratory Blank
Aluminum	± 400 ug/l of true ≤ 800 ug/l difference	4,000 ug/l	0 ± 80 ug/l
Barium	± 20 ug/l of true ≤ 40 ug/l difference	200 ug/l	0 ± 5 ug/l
Beryllium	± 20 ug/l of true ≤ 40 ug/l difference	200 ug/l	0 ± 1 ug/l
Boron	± 30 ug/l of true ≤ 60 ug/l difference	300 ug/l	0 ± 80 ug/l
Cadmium	± 20 ug/l of true ≤ 40 ug/l difference	200 ug/l	0 ± 2 ug/l
Calcium	± 10,000 ug/l of true ≤ 20,000 ug/l difference	100 ug/l	0 ± 500 ug/l
Chromium	± 70 ug/l of true ≤ 140 ug/l difference	700 ug/l	0 ± 8 ug/l
Cobalt	± 20 ug/l of true ≤ 40 ug/l difference	200 ug/l	0 ± 2 ug/l
Copper	± 70 ug/l of true ≤ 140 ug/l difference	700 ug/l	0 ± 6 ug/l
Iron	± 1,400 ug/l of true ≤ 2,800 ug/l difference	14,000 ug/l	0 ± 80 ug/l
Lead	± 200 ug/l of true ≤ 400 ug/l difference	2,000 ug/l	0 ± 70 ug/l
Lithium	± 15 ug/l of true ≤ 30 ug/l difference	150 ug/l	0 ± 10 ug/l

TABLE 4-5 (Contd.)

ACCURACY AND PRECISION FOR ICP METALS FROM CRL (Continued)

Parameter	Control Limits for Control Standards	Control Standard Concentration	Control Standards for Laboratory Blank
Magnesium	± 500 ug/l of true ≤ 1,000 ug/l difference	5,000 ug/l	0 ± 100 ug/l
Manganese	± 35 ug/l of true ≤ 70 ug/l difference	350 ug/l	0 ± 5 ug/l
Molybdenum	± 20 ug/l of true ≤ 40 ug/l difference	200 ug/l	0 ± 10 ug/l
Nickel	± 120 ug/l of true ≤ 240 ug/ difference	1,200 ug/l	0 ± 15 ug/l
Potassium	± 2,000 ug/l of true ≤ 4,000 ug/l difference	10,000 ug/l	0 ± 2,000 ug/l
Silver	± 10 ug/l of true ≤ 20 ug/l difference	100 ug/l	0 ± 3 ug/l
Sodium	± 2,000 ug/l of true ≤ 4,000 ug/l difference	20,000 ug/l	0 ± 1,000 ug/l
Strontium	± 15 ug/l of true ≤ 30 ug/l difference	150 ug/l	0 ± 10 ug/l
Tin	± 20 ug/l of true ≤ 40 ug/l difference	200 ug/l	0 ± 40 ug/l
Titanium	± 20 ug/l of true ≤ 40 ug/l difference	200 ug/l	0 ± 25 ug/l
Vandium	± 25 ug/l of true ≤ 50 ug/l difference	250 ug/l	0 ± 5 ug/l
Yttrium	± 120 ug/l of true ≤ 240 ug/l difference	1,200 ug/l	0 ± 5 ug/l
Zinc	± 300 ug/l of true ≤ 600 ug/l difference	3,000 ug/l	0 ± 40 ug/l

TABLE 4-6

ACCURACY AND PRECISION FOR FURNACE METALS AND MISCELLANEOUS INORGANICS FROM CRL

Parameter	Audit	Frequency	Control Limits	Control Standard Concentration
Mercury	Mercuric Chloride Control Standard (1)	Once per run	$\pm$ .2 ug/l of true value	1.5 ug/l
	Methyl Mercury Control Standard (2)	Beginning and end of run	$\pm$ .2 ug/l of true value $\leq$ .3 ug/l difference	1.5 ug/l
	Laboratory Blank	Once per run	0.0 $\pm$ 0.1 ug/l	
Cyanide	Undistilled Standard	Beginning and end of run	$\pm$ 15 ug/l of true $\leq$ 30 ug/l difference	100 ug/l
	Distilled Standard	Beginning and <30 ug/l difference	$\pm$ 15 ug/l of true	100 ug/l
	Distilled Blank	Once per run	0 $\pm$ 8 ug/l	
Antimony, Selenium, and Thallium	Control Standard Undigested	Beginning and end of run	$\pm$ 1 ug/l of true $\leq$ 2 ug/l difference	10 ug/l
	Laboratory Blank Undigested	Once per run	0 $\pm$ 2 ug/l	
	Laboratory Blank Digested*	Once Per run	0 $\pm$ 2 ug/l	
Lead and Arsenic	Control Standard Undigested	Beginning and end of run	$\pm$ 2 ug/l of true $\leq$ 4 ug/l difference	20 ug/l
	Laboratory Blank Undigested	Once per run	0 $\pm$ 2 ug/l	
	Laboratory Blank Digested*	Once per run	0 $\pm$ 2 ug/l	
Nitrate/Nitrite	Control Standard	Beginning and end of run	$\pm$ .15 mg-N/l of true $\leq$ 0.3 mg-N/l difference	2.0 mg-N/l
	Laboratory Blank	Once per run	0 $\pm$ 2 ug/l	

TABLE 4-6 (Contd.)

ACCURACY AND PRECISION FOR FURNACE METALS AND MISCELLANEOUS INORGANICS FROM CRL (Continued)

Parameter	Audit	Frequency	Control Limits	Control Standard Concentration
Ammonia Nitrogen	Control Standard	Beginning and end of run	± 0.5 mg-N/l of true ≤ 1.0 mg-N/l difference	8.0 mg-N/l
	Laboratory Blank	Once per run	0 ± 0.05 mg-N/l	
Total Kjeldahl Nitrogen	Control Standard	Beginning and end of run	± 0.7 mg-N/l of true ≤ 1.4 mg-N/l difference	6.8 mg-N/l
	Laboratory Blank	Once per run	0 ± 0.1 mg-N/l	
Sulfate	Control Standard (1)	Once per run	± 11 mg/l of true	100 mg/l
	Control Standard (2)	Once per run	± 6 mg/l of true	50 mg/l
	Laboratory Blank	Once per run	0 ± 4 mg/l	
Chloride	Control Standard (1)	Once per run	± 7 mg/l of true	100 mg/l
	Control Standard (2)	Once per run	± 6 mg/l of true	50 mg/l
	Laboratory Blank	Once per run	± 3 mg/l	
Flouride	Control Standard (1)	Once per run	± 0.1 mg/l of true	1.0 mg/l
	Control Standard (2)	Once per run	± 0.1 mg/l of true	.4 mg/l
	Laboratory Blank	Once per run	0 ± 0.1 mg/l	
Alkalinity	Control Standard (1)	Once per run	± 10 mg $CaCO_3$/l of true	100 mg $CaCO_3$/l
	Control Standard (2)	Once per run	± 10%	Approximately same level as samples
	Laboratory Blank	Once per run	0 ± 5 mg/l	
Chemical Oxygen Demand	Control Standard	Beginning and end of run	± 10 mg/l of true ≤ 20 mg/l difference	100 mg/l
	Digested Laboratory Blank	Once per run	0 ± 3 mg/l	

TABLE 4-6 (Contd.)

ACCURACY AND PRECISION FOR FURNACE METALS AND
MISCELLANEOUS INORGANICS FROM CRL (Continued)

Parameter	Audit	Frequency	Control Limits	Control Standard Concentration
Total Organic Carbon	Control Standard (1)	Once per run	± 6 mg/l of true	80 mg/l
	Control Standard (2)	Once per run	± 3 mg/l of true	20 mg/l
	Laboratory Blank (Acidified)	Once per run	0 ± 3 mg/l	
Total Phosphorous	Control Standard	Beginning and end of run	± 0.3 mg-P/l of true ≤ 0.6 mg-P/l difference	3.0 mg-P/l
	Laboratory Blank	Once per run	0 ± 0.05 mg-P/l	
Filterable Residue (TDS)	Control Standard	Once per run	± 100 mg/l of true	1000 mg/l
	Laboratory Blank	Once per run	0 ± 50 mg/l	
Non-Filterable Residue (TSS)	Control Standard	Once per run	± 4 mg/l of true	24 mg/l
	Laboratory Blank	Once per run	0 ± 5 mg/l	

* Will be run only if samples are digested prior to analysis.

TABLE 4-7

METHOD DETECTION LIMITS FOR ORGANICS FROM CRL

VOLATILE COMPOUNDS

PARAMETER	CAS #	METHOD* DETECTION LIMIT (ug/l)	SPIKE LEVEL IN REAGENT WATER (ug/l)	CONTROL* LIMITS (ug/l)
BENZENE	71-43-2	1.5	10	8-12
BROMODICHLOROMETHANE	75-27-4	1.5	10	8-12
BROMOFORM	75-25-2	1.5	10	8-12
BROMOMETHANE	74-83-9	10.0	10	1-20
CARBON TETRACHLORIDE	56-23-5	1.5	10	8-12
CHLOROBENZENE	108-90-7	1.5	10	8-12
CHLOROETHANE	75-00-3	1.5	10	8-12
2-CHLOROETHYL VINYL ETHER	110-75-8	1.5	10	8-12
CHLOROFORM	67-66-3	1.5	10	8-12
CHLOROMETHANE	74-87-3	10.0	10	1-20
DIBROMOCHLOROMETHANE	124-48-1	1.5	10	8-12
1,1-DICHLOROETHANE	75-34-3	1.5	10	8-12
1,2-DICHLOROETHANE	107-06-2	1.5	10	8-12
1,1-DICHLOROETHENE	75-34-4	1.5	10	8-12
trans-1,2-DICHLOROETHENE	156-60-5	1.5	10	8-12
1,2-DICHLOROPROPANE	78-87-5	1.5	10	8-12
cis-1,3-DICHLOPROPROPENE	10061-01-5	2.0	10	8-12
trans-1,3-DICHLOROPROPENE	10061-02-6	1.0	10	8-12
ETHYL BENZENE	100-41-4	1.5	10	8-12
METHYLENE CHLORIDE (1)	75-09-2	1.0	10	8-12
1,1,2,2-TETRACHLOROETHANE	79-34-5	1.5	10	8-12
TETRACHLOROETHENE	127-18-4	1.5	10	8-12
TOLUENE (1)	108-88-3	1.5	10	8-12
1,1,1-TRICHLOROETHANE	71-55-6	1.5	10	8-12
1,1,2-TRICHLOROETHANE	79-00-5	1.5	10	8-12
TRICHLOROETHENE	79-01-6	1.5	10	8-12
VINYL CHLORIDE	75-01-4	10.0	10	1-20
ACROLEIN	107-02-8	100.0	300	200-400
ACETONE (1)	67-64-1	75.0	300	225-375
ACRYLONITRILE	107-13-1	50.0	300	250-350
CARBON DISULFIDE	75-15-0	3.0	10	7-13
2-BUTANONE	78-93-3	(50)	100	50-150
VINYL ACETATE	108-05-4	15.0	15	1-30
4-METHYL-2-PENTANONE	108-10-1	(3)	20	16-24
2-HEXANONE	519-78-6	(50)	150	100-200
STYRENE	100-42-5	1.0	10	8-12
m-XYLENE	108-38-3	2.0	10	8-12
o-XYLENE (2)	95-47-6			
p-XYLENE (2)	106-42-3	2.5	20	7-13

* IN REAGENT WATER
1) COMMON LABORATORY SOLVENT - BLANK LIMIT IS 5x METHOD DETECTION LIMIT
2) THE o-XYLENE AND p-XYLENE ARE REPORTED AS A TOTAL OF THE TWO

TABLE 4-7 (Contd.)

METHOD DETECTION LIMITS FOR ORGANICS FROM CRL (Continued)

BASE/NEUTRAL AND ACID EXTRACTABLE COMPOUNDS

PARAMETER	CAS #	METHOD* DETECTION LIMIT (ug/l)	REQUESTED DETECTION LIMIT (ug/l)
ANILINE	62-53-3	1.5	
BIS (2-CHLOROETHYL) ETHER	111-44-4	1.5	
PHENOL	108-95-2	2.0	
2-CHLOROPHENOL	95-57-8	2.0	
1,3-DICHLOROBENZENE	541-73-1	2.0	
1,4-DICHLOROBENZENE	106-46-7	2.0	
1,2-DICHLOROBENZENE	95-50-1	2.5	
BENZYL ALCOHOL	100-51-6	2.0	
BIS (2-CHLOROLSOPROPYL) ETHER	118-60-1	2.5	
2-METHYLPHENOL	95-48-7	1.0	
HEXACHLOROETHANE	67-72-1	2.0	
N-NITROSODIPROPYLAMINE	621-64-1	1.5	
NITROBENZENE	98-85-3	2.5	
4-METHYLPHENOL	108-39-4	1.0	
ISOPHORONE	78-59-1	2.5	
2-NITROPHENOL	88-75-5	2.0	
2,4-DIMETHYLPHENOL	105-67-9	2.0	
BIS (2-CHLOROETHOXY) METHANE	111-91-1	2.5	
2,4-DICHLOROPHENOL	120-83-2	2.0	
1,2,4-TRICHLOROBENZENE	120-82-1	2.0	
NAPHTHALENE	91-20-3	2.0	
4-CHLOROANILINE	106-47-8	2.0	
HEXACHLOROBUTADIENE	87-68-3	2.5	1.0
BENZOIC ACID	65-85-0	(30)	
2-METHYLNAPHTHALENE	91-57-6	2.0	
4-CHLORO-3-METHYLPHENOL	59-50-7	1.5	
HEXACHLOROCYCLOPENTADIENE	77-47-4	2.0	2.0
2,4,5-TRICHLOROPHENOL	95-95-4	1.5	
2,4,6-TRICHLOROPHENOL	88-06-2	1.5	
2-CHLORONAPHTHALENE	91-58-7	1.5	
ACENAPHTHYLENE	208-96-8	1.5	
DIMETHYL PHTHALATE	131-111-3	1.5	
2,6-DINITROTOLUENE	606-20-2	1.0	
ACENAPHTHENE	83-32-9	1.5	
3-NITROANILINE	99-09-2	2.5	

* In Reagent Water

NOTE: Method Blank Limit in Reagent Water is 2x Detection Limit
Values in Parenthesis are estimated.

TABLE 4-7 (Contd.)

METHOD DETECTION LIMITS FOR ORGANICS FROM CRL (Continued)

BASE/NEUTRAL AND ACID EXTRACTABLE COMPOUNDS (Continued)

PARAMETER	CAS #	METHOD* DETECTION LIMIT (ug/l)	REQUESTED DETECTION LIMIT (ug/l)
DIBENZOFURAN	132-64-9	1.0	
2,4-DINITROPHENOL	51-28-5	(15)	
2,4-DINITROTOLUENE	121-14-2	1.0	
FLUORENE	86-73-7	1.0	
4-NITROPHENOL	100-02-7	1.5	
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	1.0	
DIETHYL PHTHALATE	84-66-2	1.0	
4,6-DINITRO-2-METHYLPHENOL	534-52-1	(15)	
1,2-DIPHENYLHYDRAZINE (AZOBENZENE)	122-66-7	1.0	
N-NITROSODIPHENYLAMINE AND DIPHENYLAMINE	100-01-6	3.0	
4-NITROANILINE	100-01-6	3.0	
4-BROMOPHENYL PHENYL ETHER	101-55-3	1.5	
HEXACHLOROBENZENE	118-74-1	1.5	1.5
PENTACHLOROPHENOL	87-86-5	2.0	
PHENANTHRENE	85-01-8	1.0	
ANTHRACENE	120-12-7	2.5	
DI-n-BUTYL PHTHALATE	84-74-2	2.0	
FLUORANTHENE	206-44-0	1.5	
PYRENE	129-00-0	1.5	
BUTYL BENZYL PHTHALATE	85-68-7	3.5	
CHRYSENE**	218-01-9		
BENZO (a) ANTHRACENE**	56-55-3	1.5	
BIS (2-ETHYLHEXYL) PHTHALATE	117-81-7	1.0	
DI-n-OCTYL PHTHALATE	117-84-0	1.5	
BENZO (b) FLUORANTHENE***	205-99-2		
BENZO (k) FLUORANTHENE***	207-08-9	1.5	
BENZO (a) PYRENE	193-39-5	2.0	
INDENO (1,2,3-cd) PYRENE	193-39-5	3.5	
DIBENZO (a,h) ANTHRACENE	53-70-3	2.5	
BENZO (ghi) PERYLENE	191-24-2	4.0	
2-NITROANILINE	88-74-4	1.0	
HEXACHLORONORBORADIENE		-	1.0
OCTACHLOROCYCLOPENTENE		-	1.0
HEPTACHLORONORBORENE		-	1.0
CHLORDENE		-	1.0

* In Reagent Water
** These two parameters reported as a total
*** These two parameters reported as a total

Note: Values in parameters are estimated

TABLE 4-7 (Contd.)

METHOD DETECTION LIMITS FOR ORGANICS FROM CRL (Continued)

PESTICIDES AND PCBS

PARAMETER	CAS #	METHOD* DETECTION LIMIT ug/l	REQUESTED DETECTION LIMIT (ug/l)
ALDRIN	309-00-2	0.005	
alpha BHC	319-84-6	(0.010)	
beta BHC	319-85-7	(0.005)	
delta BHC	319-86-8	(0.005)	
gama BHC (LINDANE)	58-89-9	0.005	
CHLORADANE	57-74-9	(0.020)	
4,4'-DDD	72-54-8	(0.020)	
4,4'DDE	72-55-9	(0.005)	
4,4'-DDT	50-29-3	0.020	
DIELDRIN	60-57-1	0.010	
ENDOSULFAN I	959-98-8	0.010	
ENDOSULFAN II	33213-65-9	0.010	
ENDOSULFAN SULFATE	1031-07-8	(0.10)	
ENDRIN	72-20-8	0.010	
ENDRIN ALDEHYDE	7421-93-4	(0.030)	
ENDRIN KETONE	53494-70-5	(0.030)	
HEPTACHLOR	76-44-8	0.030	
HEPTACHLOR EPOXIDE	1024-57-3	0.005	
4,4'-METHOXYCHLOR	72-43-5	0.020	
TOXAPHENE	8001-35-2	(0.25)	
PCB-1242	53469-21-9	(0.10)	
PCB-1248	12672-29-6	(0.10)	
PCB-1254	11097-69-1	(0.10)	
PCB-1260	11096-82-5	(0.10)	
HEXACHLOROBENZENE			0.05
HEXACHLOROCYCLOPENTADIENE			0.1
HEXACHLOROBUTADIENE			0.05
HEXACHLORONORBORADIENE			0.05
OCTACHLOROCYCLOPENTENE			0.05
HEPTACHLORONORBORENE			0.05
CHLORDENE			0.05

* In Reagent Water

Note: Values in parentheses are estimated.

TABLE 4-8

METHOD DETECTION LIMITS FOR INORGANICS FROM CRL

Parameter	Method Detection Limit* (ug/l)	Upper Limit of Working Range Without Dilution*
Aluminum	80	1×10^6
Chromium	8	2×10^4
Barium	5	2×10^4
Beryllium	1	2×10^4
Cobalt	6	2×10^4
Copper	6	2×10^4
Iron	80	1×10^6
Lithium	10	2×10^4
Nickel	15	2×10^4
Manganese	5	2×10^4
Molybdenum	10	2×10^4
Zinc	40	1×10^6
Boron	80	2×10^4
Vanadium	5	2×10^4
Silver	3	1×10^4
Arsenic	2	30
Antimony	2	30
Selenium	2	30
Thallium	2	30
Mercury	.1	2.0
Tin	40	2×10^4
Strontium	10	2×10^4
Titanium	25	2×10^4
Vanadium	5	2×10^4
Yttrium	5	2×10^4
Calcium	500	1×10^6
Potassium	2000	1×10^6
Magnesium	100	2×10^5
Sodium	1000	1×10^6
Cadmium	2	2×10^4
Lead	2	30 (AA), 2×10^4 (ICP)
Cyanide	5	200
Alkalinity ($CaCO_3$)	5000	3×10^5
Chloride	3000	2×10^5
Fluoride	100	4×10^3
Sulfate	4000	3×10^5
Ammonia Nitrogen	.1	10
TKN	100	1×10^5
Nitrate and Nitrite	.1	10
TOC	3000	1×10^5
Total Phosphorous	50	4×10^3
Chemical Oxygen Demand	3000	4×10^5
TDS	2×10^4	N/A
TSS	5000	N/A

* In Reagent Water

The geotechnical data will be considered accurate if the QA criteria with respect to equipment, solutions and calculations are met, and if adherence to appropriate methods can be documented during a systems audit. The precision of these data will be assessed using the duplicate results, but no quantitative criteria have been established. The geotechnical data will be adequately sensitive if adherence to appropriate methods can be documented during a systems audit.

4.4 COMPLETENESS, REPRESENTATIVENESS AND COMPARABILITY

It is expected that the CLP and the laboratories performing analyses on high hazard extracts will provide data meeting QC acceptance criteria for 95 percent of all samples tested. Completely valid data are required for samples designated in the Sampling and Analysis Plan (Appendix B) as "background samples."

The CRL, the laboratories performing SAS for additional pesticides and total suspended solids, and the geotechnical laboratory should provide completely valid data. The reasons for any variances from 100 percent completeness by these laboratories will be documented in writing by those laboratories.

The sampling network was designed to provide data representative of site conditions. During development of this network consideration was given to past waste storage and disposal practices, existing analytical data, remedial activities to date, physical setting and processes, and constraints inherent to the Superfund program. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data are documented in this QAPP. It may be necessary to verify similar documentation for existing analytical data.

4.5 FIELD MEASUREMENTS

Measurement data will be generated in many field activities that are incidental to collecting samples for analytical testing or unrelated to sampling. These activities include, but are not limited to, the following:

- Documenting time and weather conditions
- Locating and determining the elevation of sampling stations
- Performing geophysical surveys
- Calculating flow rates for stormwater or surface water
- Determining pH, specific conductance and temperature of water samples

- Qualitative organic vapor screening of soil samples using an OVA and/or HNu
- Determining depths in a borehole or well
- Standard penetration testing
- Calculating pumping rates
- Verifying well development and pre-sampling purge volumes
- Performing bail-down recovery tests.

The general QA objective for such measurement data is to obtain reproducible and comparable measurements to a degree of accuracy consistent with the intended use of the data through the documented use of standardized procedures. The procedures for performing these activities and the standardized formats for documenting them are presented in the Sampling and Analysis Plan (Appendix B).

SECTION 5

SAMPLING PROCEDURES

The procedures for collecting samples and for performing all related field activities are described in detail in the Sampling and Analysis Plan, which is attached in full as Appendix B.

SECTION 6

SAMPLE CUSTODY

Region V, U.S. EPA sample custody (chain-of-custody) protocols are described in "NEIC Policies and Procedures." EPA-330/9-78-001-R, Revised 1985. This custody is in three parts: 1) sample collection, 2) laboratory, and 3) final evidence files. Field custody (sample collection) procedures are also described in the Sampling and Analysis Plan (Appendix B); and laboratory procedures for the CLP are also described in IFB's WA85-J664/J680 for organics and IFB's WA85-J838/J839 for inorganics. The CRL sample custody will be maintained according to U.S. EPA Region V Environmental Services Division Procedures Manaual (1980).

SECTION 7

CALIBRATION PROCEDURES AND FREQUENCY

The calibration procedures and frequency of calibration for RAS from the CLP are specified in the IFBs, WA85-J664/J680 for organics and WA85-J838/J839 for inorganics. The laboratories performing analyses on high hazard extracts for the RAS organics and inorganics parameters will use the same calibration procedures and frequencies. Calibration procedures and frequency for analytical services from the CRL are specified for each analytical procedure. For information purposes, Tables 7-1 and 7-2 list the CRL method numbers for analysis of the parameters of interest to this RI/FS.

Calibration of equipment used to perform the geotechnical testing will be in accordance with that specified in the ASTM method descriptions -- ASTM D 4318 for Atterberg Limits and ASTM D 422 for hydrometer and sieve analyses. The equipment calibrations, including those for ovens, thermometers and balances, shall be done not more than 6 months prior to actual testing.

Calibration of the OVA and HNu organic vapor detection devices will be done prior to use each day and after every four hours of use. Calibration will be done using reference gases in accordance with manufacturer's specifications, which are referenced in the Sampling and Analysis Plan (Appendix B).

Calibration of the field pH meter will be done prior to the collection of each water sample. The field pH meter will be calibrated using two reference solutions as appropriate to the pH of the sample. The calibration of the YSI specific-conductance/temperature meter will be checked using a reference solution of 0.01 N KCl (specific conductance, 1413 umhos/cm at 25°C) on a daily basis. Readings must be within 5 percent to be acceptable. The thermometer of the YSI meter will be calibrated against a laboratory thermometer on a weekly basis. Additional information regarding the calibration of these meters can be found in the Sampling and Analysis Plan (Appendix B).

Tape measures used to locate sampling stations and to determine depths in boreholes or wells will be examined prior to each period of sustained use to verify their calibration.

TABLE 7-2

ANALYTICAL METHODS FOR ORGANICS ANALYSIS FROM CRL

Parameter	CRL Method Number	CRL Method Designation	Effective Date
Base/Neutral/Acid Compounds	625 S	GC/MS/DS analysis of nonvolatile organic compounds	In Effect
Volatiles	624 S	Analysis of volatile organic compounds in drinking water samples using GC/MS	In Effect
Pesticides and PCBs	608 S	Organochlorine pesticides and PCBs	In Effect

TABLE 7-2 (Contd.)

ANALYTICAL METHODS FOR INORGANICS ANALYSIS FROM CRL

Parameter	CRL Method Number	CRL Method Designation	Effective Date
Mercury	245.2 S	Total Mercury (automated persulfate digestion, cold-vapor AA determination)	In Effect
Cyanide	335.3 S 335.2 S	Screen by Method 335.3 S and confirm positive values using Method 335.2 S for total cyanide (manual distillation, automated spectrophotometric determination.	In Effect
Ammonia Nitrogen	350.1 S	Automated phenolate/nitroprusside spectrophotometric determination	In Effect
Nitrate and Nitrite	353.2 S	Cadmium reduction, automated spectrophotometric determination	In Effect
Total Kjeldahl Nitrogen	351.2 * GNS	Colorimetric, semi-automated, block digestor, AA II	In Effect
Sulfate	375.2 SND	Colorimetric, automated Methylene Blue, AA II	In Effect
Chloride	325.2 SND	Colorimetric, automated Ferricyanide, AA II	In Effect
Flouride	340.1 SN	Potentiometric, ion selective electrode	In Effect
Alkalinity	310.1 SN	Titrimetric, pH 4.5	In Effect
Chemical Oxygen Demand	410.4 *GNS	Colorimetric, Automated, Manual	In Effect
Total Organic Carbon	415.1 SDN	Combustion	In Effect
Total Phosphorous	365.4 *GNS	Colorimetric, semi-automated, block-digestor, AA II	In Effect
Residue - Filterable (TDS)	160.1 SDN	Gravimetric, dried at 180°C	In Effect
Residue - Non-Filterable (TSS)	160.2 SDN	Gravimetric, dried at 103-105°C	In Effect

TABLE 7-2 (Contd.)
ANALYTICAL METHODS FOR INORGANICS ANALYSIS FROM CRL (Continued)

Parameter	CRL Method Number	CRL Method Designation	Date
Antimony	204.1 S	Atomic Absorption, AA Furnace[1/] Technique, Standard Addition	In Effect
Arsenic	206.2 S	Atomic Absorption, AA Furnace[1/] Technique, Standard Addition	In Effect
Lead	239.2 S	Atomic Absorption, AA Furnace[1/] Technique, Standard Addition	In Effect
Selenium	270.2 S	Atomic Absorption, AA Furnace[1/] Technique, Standard Addition	In Effect
Thallium	279.2 S	Atomic Absorption, AA Furnace[1/] Technique, Standard Addition	In Effect
Aluminum, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Silver, Sodium, Strontium, Tin, Titanium, Vanadium, Yttrium, Zinc	200.7 S	Inductively Coupled Plasma, Digested	In Effect

1/ Samples containing suspended or settled particulates will be digested prior to analysis.

SECTION 8

ANALYTICAL PROCEDURES

All waste, soil, groundwater, surface water, sediment and biological samples collected for chemical analysis will be tested for the complete RAS organics and RAS inorganics (metals and cyanide) packages through the CLP. (For high hazard samples, the CLP will prepare extracts at HSLs, and these extracts will be tested for the RAS organics and inorganics packages by SAS request.) The methods for performing the RAS analyses are specified in the SOWs, WA85-J838/J839 for organics and WA85-J664/J680 for inorganics. The testing will also conform to the guidelines in the "User's Guide to the U.S. EPA Contract Laboratory Program, Revised October 1984." The analytical results for metals in soil and sediment will be reported on a dry weight basis.

All samples collected from private wells will be tested for organics and inorganics parameters by the CRL as indicated in Tables 2-2 and 2-3. The analytical methods for performing these analyses are shown in Tables 7-1 and 7-2 respectively. The analytical methods for performing SAS of additional pesticides and total suspended solids are described in the individual SAS request forms which are attached in Appendix C.

As part of organics analysis by both CLP and CRL, computer assisted library searches will be made to tentatively identify as many as 30 organic compounds (10 volatiles and 20 extractables) in addition to those listed in Table 2-2. An SAS for extra effort in evaluation of tentatively identified compounds is included in Appendix C. The SAS presents the criteria to be used and the data to be reported from this work.

Geotechnical testing of soil samples will use the methods specified by ASTM. Atterberg Limits will be determined using method ASTM D 4318-83. Hydrometer and sieve analyses will be performed using method ASTM D 422-63. These methods can be found in "ASTM 1984 Annual Book of Standards, Volume 4.08, Soil and Rock; Building Stones," pgs 750-765 and pgs 116-126 respectively.

SECTION 9

DATA REDUCTION, VALIDATION AND REPORTING

Analytical data from the CLP, including data generated by SAS analysis of high hazard extracts, will be evaluated by the Sample Management Office and the Contract Program Management Section of the CRL. In addition to the summarized forms for precision and accuracy of the analyses (EPA Form 1320-6), the CRL is requested to provide the analytical results for blanks and duplicates and the recovery data for matrix and surrogate spikes to the Site Manager.

Data reduction, validation, and reporting for analytical services at CRL are illustrated in Figure 9-1. Analytical reports from the field laboratory and the geotechnical laboratory will include all raw data, documentation of reduction methods, and related QA/QC data. The data will be assessed by verification of the reduction results and confirmation of compliance with QA/QC requirements. The field and geotechnical laboratory deliverables packages will be appended to the RI report.

Raw data from field measurements and sample collection activities that is used in project reports will be appropriately identified and appended to the RI report. Where data have been reduced or summarized, the method of reduction will be documented in the report.

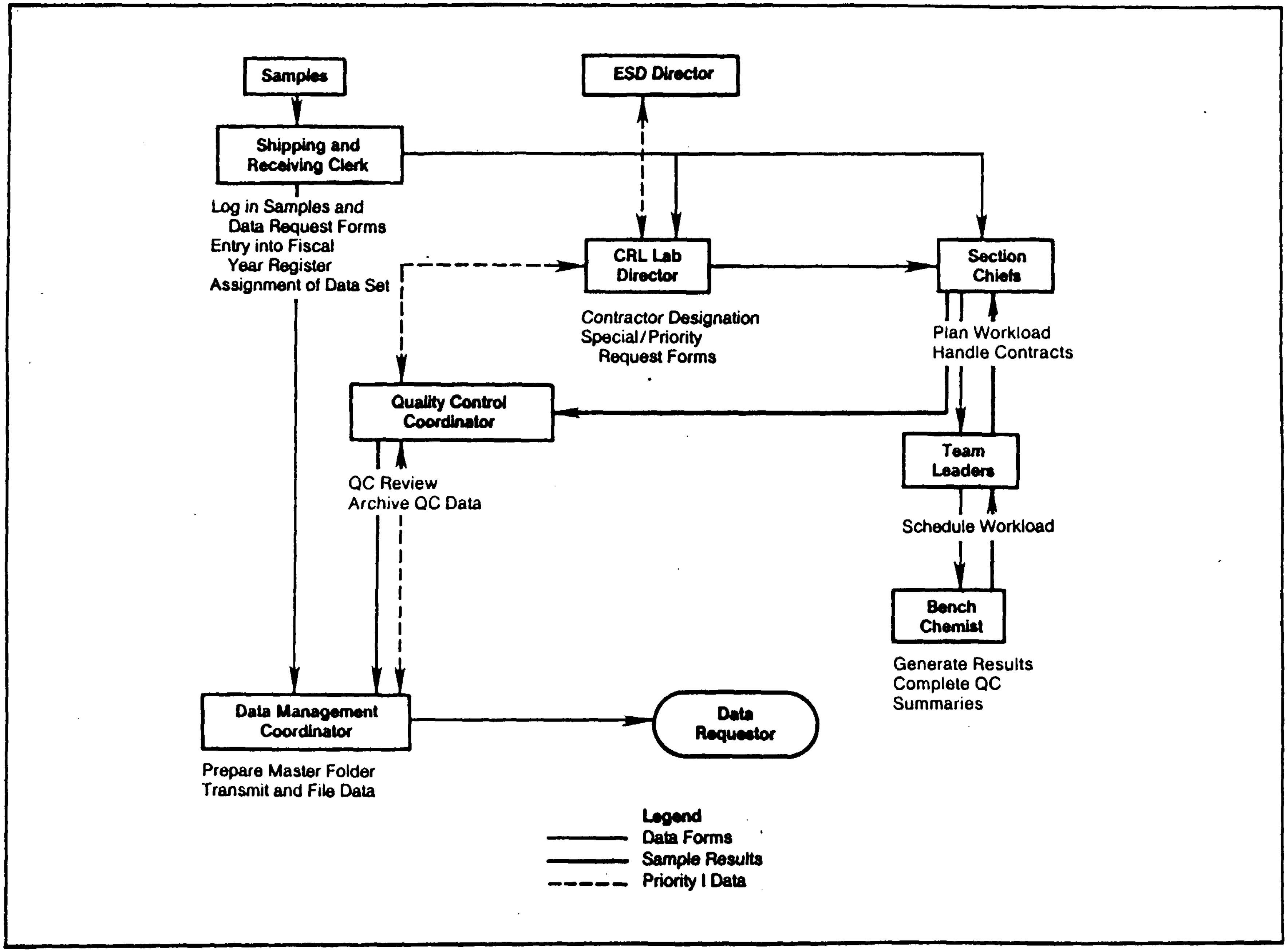


FIGURE 9-1 **DATA FLOW AT CRL**

SECTION 10

INTERNAL QUALITY CONTROL PROCEDURES

Internal quality control procedures for RAS from the CLP are specified in SOWs WA85-J664/J680 for organics and WA85-J838/J839 for inorganics. The laboratories performing analyses of high hazard extracts for the RAS organics and inorganics parameters will use the same internal QC procedures. These specifications include the types of audits required (sample spikes, surrogate spikes, reference samples, controls, blanks), the frequency of each audit, the compounds to be used for sample spikes and surrogate spikes, and the quality control acceptance criteria for these audits.

Typical internal quality control procedures for analytical services from the CRL are summarized in Tables 4-1, 4-4 and 4-5 on the basis of the parameters being tested for. Table 4-1 lists the types and frequencies of QC audits; and Tables 4-4 and 4-5 present the QC acceptance limits for organics and inorganics respectively. Table 4-4 also includes the compounds to be used for surrogate and sample (matrix) spikes. The quality of data generated by the CRL is directly monitored at the bench level, and the QC data is reviewed at three administrative levels (Figure 9-1) before being issued to the user. Internal quality control requirements for the SAS of additional pesticides and total suspended solids are described in the individual SAS request forms which are attached in Appendix C.

The quality control audits and acceptance criteria for data from the geotechnical laboratory are described above in Subsections 4.2 and 4.3. Quality control procedures for field measurements are limited to checking the reproducibility of the measurement in the field by obtaining multiple readings and/or by calibrating the instruments (where appropriate). Quality control of field sampling will involve collecting field duplicates and blanks in accordance with the applicable procedures described in the Sampling and Analysis Plan (Appendix B) and the level of effort indicated in Table 2-4.

SECTION 11

PERFORMANCE AND SYSTEMS AUDITS

Performance and systems audits of the CLP will be scheduled and executed by EMSL-Las Vegas. Performance audits, which are based on the laboratory's ability to properly analyze an unknown reference sample, are done on a quarterly basis. Systems audits are based on onsite inspection of the laboratory. Audits of the CRL will be scheduled and executed by the Quality Assurance Office or QC Coordinator, CRL of Region V, U.S. EPA. Performance audits are done on a quarterly basis, and systems audits are done on an annual basis.

The Site Manager will monitor and audit the performance of QA/QC procedures to ensure that the project is executed in accordance with this QAPP. Systems audits of the geotechnical laboratory will be scheduled by the Site Manager and executed by the individuals identified above in Subsection 3.3. One systems audit will be performed for each of these laboratories during the project. A performance audit of the geotechnical laboratory is not required.

The Site Manager will also schedule two systems audits of the sampling and monitoring-well installation activities to ensure that the Sampling and Analysis Plan is being adhered to and/or that variances are justified and documented. These audits will be scheduled to allow oversight of as many different field activities as possible, and will be performed by the individual identified above in Subsection 3.3.

SECTION 12

PREVENTIVE MAINTENANCE

This section applies solely to field equipment. For this project, this includes a field pH meter, a YSI specific conductance and temperature meter, a Foxboro Century 128 OVA, and an HNu photoionization detector. Specific preventive maintenance procedures and spare parts lists for this equipment are referenced in the Sampling and Analysis Plan (Appendix B). The Field Manager will be responsible for implementing and documenting these procedures on a weekly basis during the period of use.

SECTION 13

DATA ASSESSMENT PROCEDURES

Analytical data from the CLP, including data generated by SAS analysis of high hazard extracts, are assessed for accuracy, precision, and completeness by the Contract Program Management Section of the CRL with overview by the Sample Management Office of the CLP in accordance with respective standard procedures.

The assessment of data generated by the CRL is initiated at the bench level and continued at three administrative levels. The bench chemist directly responsible for the test knows the current operating acceptance limits. He can directly accept or reject the data he generates and consult with his Team Leader for any corrective action. Once the bench chemist has reported the data that he feels are acceptable, he initials the report sheet. Any out-of-control results that occurred are flagged and a note is made as to why the result was reported.

The Team Leader receives the data sheets, reviews the quality control data that accompanied the sample run, initials the report sheet, and forwards it to the Section Chief. The Section Chief, after checking the reported data for completeness and quality control results, either initials the report sheet or sends it back to the Team Leader for rerunning of samples. The QC Coordinator reviews the data forwarded to him as acceptable by the Section Chief. Any remaining out-of-control results that, in the opinion of the QC Coordinator, do not necessitate rerunning of the sample are flagged and a memo written to the data user regarding the utility of the data. Data generated from all high priority studies are given a final review by the CRL Director.

Data from the laboratories performing SAS for additional pesticides and total suspended solids, data from the geotechnical laboratory, and data from field measurements will be assessed by thorough review of QA/QC data (calibrations, standards, blanks, duplicates), documentation that analytical procedures were adhered to, and reports from systems audits.

All data will be reviewed for completeness by the principal investigators as appropriate to their operational responsibilities.

SECTION 14

CORRECTIVE ACTION PROCEDURES

The Regional Quality Assurance Coordinator and the audit team will prepare a report for review by REM II QAC or his deputy describing the results of the performance and/or system audits. If unacceptable conditions or data, nonconformance with the QC procedure, or a deficiency are identified in the report of the performance or systems audit, the REM II QAD or his deputy will notify the Technical Operations Manager, the Regional Manager, and the Site Manager in writing of the results of the audit. He will also state if the nonconformance is of program significance. The Technical Operations Manager will be responsible for ensuring that action to correct the nonconformance has been developed, initiated and, if needed, that special expertise not normally available to the project team is made available. The Site Manager will be responsible for carrying out the corrective actions. In addition, the Site Manager shall ensure that no additional work, which is dependent on the nonconforming activity, is performed until the nonconformance report is corrected. Corrective action may include:

- Re-analyzing the samples, if holding time permits
- Resampling and re-analyzing
- Evaluating and amending the sampling and analytical procedures
- Accepting the data and acknowledging its level of uncertainty

The Regional Quality Assurance Coordinator will be responsible for ensuring that the corrective action has indeed been taken, and that it adequately addresses the nonconformance. A Nonconformance Report Form will be filed for all non-CLP laboratory-related deficiencies.

Following the implementation of a satisfactory corrective action, the Regional Quality Assurance Coordinator shall document the completion of the audit by indicating such on a Quality Assurance Notice Form. The notice will indicate the completion of the audit, any identified nonconformance, the corrective action that was taken, the follow-up action, and the final recommendations.

All project staff shall be responsible for reporting all suspected nonconformances while conducting field activities and any suspected technical nonconformances on deliverables or documents by initiating a nonconformance report.

The QAC will be responsible for ensuring the corrective actions for nonconformances are implemented by:

- Evaluating all reported nonconformances
- Controlling additional work on nonconforming items
- Maintaining the log of nonconformances
- Evaluating disposition or action taken
- Ensuring nonconformance and correction reports are included in the site documentation files.

If the systems audit of the field or geotechnical laboratory results in the detection of unacceptable conditions or data, the auditor will notify the QAC, who will be responsible for initiating a nonconformance report and ensuring corrective actions are taken.

SECTION 15

QA REPORTS

No separate QA report is planned for this project. The revised RI report and the revised FS/Conceptual Design report will each contain separate QA/QC sections summarizing the quality of the data collected and/or used as appropriate to each phase of the project. The Site Manager, who has responsibility for these summaries, will rely on written reports/memoranda documenting the data assessment activities and the performance and systems audits. Quality assurance notices and nonconformance notices will be included as part of the quality assurance record.

APPENDIX A

EXISTING ANALYTICAL DATA

APPENDIX A-1

Surface Puddles

4-26-76

OHIO DEPARTMENT OF HEALTH
WATER QUALITY DATA

Date Received	4-27-76
Date Reported	4-29-76
Laboratory	2
Laboratory Number	13577
Analyst	T. G.
Station Code	
County	Butler
Location	F Skinner - Lagoon Puddle Below Landfill Fen
Collected by	Ken Ghent
Phone	
Identification of Sample	3 of 3
Sample Code	

Date of grab sample (or last date of composite sample)	Year	Month	Day	Hour	Minute	Composite Type
	76	04	26	18	36	

Beginning Date of Composite Sample	Year	Month	Day	Hour	Minute	Frequency
				C		

Sample Types: ☐ Ground Water ☒ Industrial ☐ Sewage ☐ Comp Mon ☐ Water Supply ☐ Stream

Analyses to be Reported to: ☐ CO ☐ CDO ☐ SE ☐ NE ☒ SW ☐ NW

REASON FOR TAKING SAMPLE — ADDITIONAL INFORMATION — REMARKS BY ANALYST:

PRESERVATIVE:
N H
C O
H O
HNO3
OTHER

COMPLAINT

Parameter	Code	Value	Unit	Parameter	Code	Value	Unit	Parameter	Code	Value	Unit
☐ P... (or indicate by checking boxes)				☐ Fluoride Diss. F	H1		mg/l	☒ Cyanide, CN	N1	0.23	
☐ ...	Y2		CFS	☐ Calcium Total Ca	H2		mg/l	☐ MBAS	N2		
☐ Water Temperature, Field	Y3		C°	☐ Magnesium Total Mg	H3		mg/l	☐ Oil-Grease, Total	N3		
☐ pH, Field	Y4		S.U	☐ Potassium Total K	H4		mg/l	☒ Phenols	N4	310	
☐ D..lved Oxygen, Field	Y5		mg/l	☐ Sodium Total Na	H5		mg/l	☐ Tannin Lignin	N5		
☐ H..ogen Sulfide, Field	Y6		mg/l	☐ Aluminum Total Al	H6		ug/l	☐ Aldrin, Whl Smpl	N6		
☐ Chlorine Free Avl. Field	Y7		mg/l	☐ Antimony Total Sb	H7		ug/l	☐ DDD, Whl Smpl	N7		
☐ C..ne Tot Resd. Field	Y8		mg/l	☐ Arsenic Total As	H8		ug/l	☐ DDE, Whl Smpl	N8		
☐ C...	Y9		Pt-Co	☐ Barium Total Ba	H9		ug/l	☐ DDT, Whl Smpl	N9		
☐ Odor	Y0		T.N	☐ Beryllium Total Be	H0		ug/l	☐ Dieldrin, Whl Smpl	N0		
☐ T..idity	U1		FTU	☐ Bismuth Total Bi	J1		ug/l	☐ Chlordane, Whl Smpl	M1		
☐ C..uctivity at 25 C°	U2		U-MHO	☐ Boron Total B	J2		ug/l	☐ Endrin, Whl Smpl	M2		
☐ pH, Lab	U3		S.U	☐ Cadmium Total Cd	J3		ug/l	☐ Heptachlor, Whl Smpl	M3		
☐ pH CaCO3 Stability	U4		S.U	☐ Chromium Total Cr	J4		ug/l	☐ Hchlr-Epoxide, Whl Smpl	M4		
☐ A..inity Total CaCO3	U5		mg/l	☐ Chromium Hex. Cr	J5		ug/l	☐ Lindane, Whl Smpl	M5		
☐ Alkalinity Phth. CaCO3	U6		mg/l	☐ Cobalt Total Co	J6		ug/l	☐ Methoxychlor Whl Smpl	M6		
☐ ..ity CaCO3 Stabl	U7		mg/l	☐ Copper Total Cu	J7		ug/l	☐ Malathion, Whl Smpl	M7		
☐ C..on Dioxide CO2	U8		mg/l	☐ Iron Total Fe	J8		ug/l	☐ Parathion, Whl Smpl	M8		
☐ A..ity Total CaCO3	U9		mg/l	☐ Iron Diss Fe	J9		ug/l	☐ Methyl Parathn, Whl Smpl	M9		
☐ Ac..ity M.O. CaCO3	U0		mg/l	☐ Iron Ferrous, Fe	J0		ug/l	☐ Beta, Total	M0		
☐ H..ness Total CaCO3	I1		mg/l	☐ Lead Total Pb	K1		ug/l	☐ Beta, Diss	,1		
☐ R..due Total	I2		mg/l	☐ Lithium Total Li	K2		ug/l	☐ Beta, Suspd	,2		
☐ Residue, Total Volatile	I3		mg/l	☐ Manganese Total Mn	K3		ug/l	☐ Alpha, Total	,3		
☐ R..due, Total Nflt (Susp)	I4		mg/l	☐ Mercury Total Hg	K4		ug/l	☐ Alpha, Diss	,4		
☐ R..due Vol Nflt	I5		mg/l	☐ Molybdenum Total Mo	K5		ug/l	☐ Alpha, Suspd	,5		
☐ Residue, Total Flt (Diss)	I6		mg/l	☐ Nickel Total Ni	K6		ug/l	☐ Radium 226, Total	,6		
☐ R..due Vol Flt	I7		mg/l	☐ Selenium Total Se	K7		ug/l	☐ Strontium 90, Total	,7		
☐ R..due, Settable	I8		mg/l	☐ Silver Total Ag	K8		ug/l	☐ Coliform Total, MF	,8		#/
☐ Nitrogen Organic, N	I9		mg/l	☐ Strontium Total Sr	K9		ug/l	☐ Coliform Total MPN, Conf	,9		#/
☐ Nitrogen Ammonia, N	I0		mg/l	☐ Thallium Total Tl	K0		ug/l	☐ Fecal Coli Total, MF	,0		#/
☐ N..ite, N	O1		mg/l	☐ Tin Total Sn	L1		ug/l	☐ Fecal Strep Total, MF	.1		#/
☐ Nitrate, N	O2		mg/l	☐ Titanium Total Ti	L2		ug/l	☐ Plate Count, Total	.2		
☐ Phosphorus Total, P	O3		mg/l	☐ Tungsten Total T	L3		ug/l	☐ Algae, Total	.3		
☐ Phosphorus Soluble, P	O4		mg/l	☐ Vanadium Total V	L4		ug/l	☐ 100	.4		
☐ Phosphate Total, PO4	O5		mg/l	☐ Zinc Total Zn	L5		ug/l	☐ BHC	.5		
☐ Phosphate Ortho, PO4	O6		mg/l	☐ Zirconium Total Zr	L6		ug/l	☐ TKN	.6		
☐ ..ate SO4	O7		mg/l	☐ BOD, 5-Day	L7		mg/l	☐ Conductivity, Field	.7		U
☐ ..ite SO3	O8		mg/l	☐ COD	L8		mg/l	☐			
☐ Sulfide, S	O9		mg/l	☐ Chlorine Demand, 15 min	L9		mg/l	☐			

APPENDIX A-2

Private Wells

5-3-76

Table 2-5
GROUNDWATER ANALYSES (mg/l)
SKINNER LANDFILL

LOCATION: / DATE:	Well B-5 07/27/82	Well B-6 07/27/82	Blank 07/27/82	Douglas Residence 05/03/76	Hancock Residence 05/03/76	EPA Water Quality Criteria
Silver (Ag)	0.030	0.012	ND			0.05
Aluminum (Al)	0.53	16	ND			—
Barium (Ba)	0.35	0.48	ND	< 0.20	.020	1
Beryllium (Be)	ND	ND	ND			—
*Chromium (Cr)	0.055	0.045	ND	< 0.03	< 0.03	0.50
Cobalt (Co)	0.31	0.19	ND			—
*Copper (Cu)	ND	0.065	ND	< 0.03	< 0.03	—
Iron (Fe)	8.7	55	0.22	< 0.03	0.14	—
Manganese (Mn)	18	7.6	0.035			—
*Nickel (Ni)	0.41	0.30	ND	< 0.1	< 0.1	13.4
Vanadium (V)	ND	ND	ND			—
*Zinc (Zn)	0.41	0.39	0.040	0.27	0.70	—
*Arsenic (As)	ND	0.018	ND	< 0.01	< 0.01	0.05
*Cadmium (Cd)	0.064	0.032	0.001	< 0.01	< 0.01	0.010
*Mercury (Hg)	ND	0.00033	ND	< 0.005	< 0.005	0.002
*Lead (Pb)	0.54	0.023	ND	< 0.01	< 0.01	0.050
Selenium (Se)	0.011	ND	ND			0.01
Antimony (Sb)	ND	ND	ND			—
Tin (Sn)	ND	ND	ND			—
Thallium (Te)	ND	ND	ND			—
Cyanide	ND	ND	ND	< .01	< .01	—
Calcium Carbonate				374	366	—
Sulfate				81	52	—
Chloride				42	10	—
Phenols				< 2	< 2	—

ND = Not detected.
* = Priority pollutant.
— = No criteria set.

GLT420/10

Source: Skinner Landfill Site - Remedial Action Master Plan
May 18, 1983; CH2M-Hill, Inc.

Table 2-3
RESIDENTIAL WELL LOGS

1. Tom Hancock - sampled 5/3/76
   0-5' topsoil
   5-17' sand and clay
   17-60' rock
   Static level - 15 feet
   Water at 15 feet
   3 gpm

2. Russell Klein
   0-35.5' clay
   35.5-104' limestone
   Static level - 38 feet

3. Ronald Harper
   0-40' clay
   40-75' gravel
   75-90' gray shale

4. Lee Ball
   0-42' clay
   42-80' gravel
   80-96' clay
   96-130' gray shale
   130-150' gray limestone
   Static level - 110 feet
   Casting set into shale

5. Joseph
   0-10' clay
   10-30' gravel
   42-50' gravel
   Static level - 26 feet

6. Williams
   0-3' topsoil
   3-16' yellow clay
   16-20' sand and clay
   20-31' gravel and clay
   31-34' sandstone (?)
   Static level - 17 feet

7. James Riesenberg
   0-46' sandy clay
   46-50' sand and gravel
   10 gpm

8. Cecil Faber
   0-7' topsoil
   7-75' sand and gravel
   water at 55'

9. Presbyterian Church
   0-18 clay
   18-22 sand
   22-59 clay
   Static level - 10 feet

10. Kenneth Joseph
    0-5' clay
    5-20' creek gravel
    20-45' clay
    45-52' creek gravel
    52-54 sandstone (?)

11. West
    0-6' clay
    6-58' shale

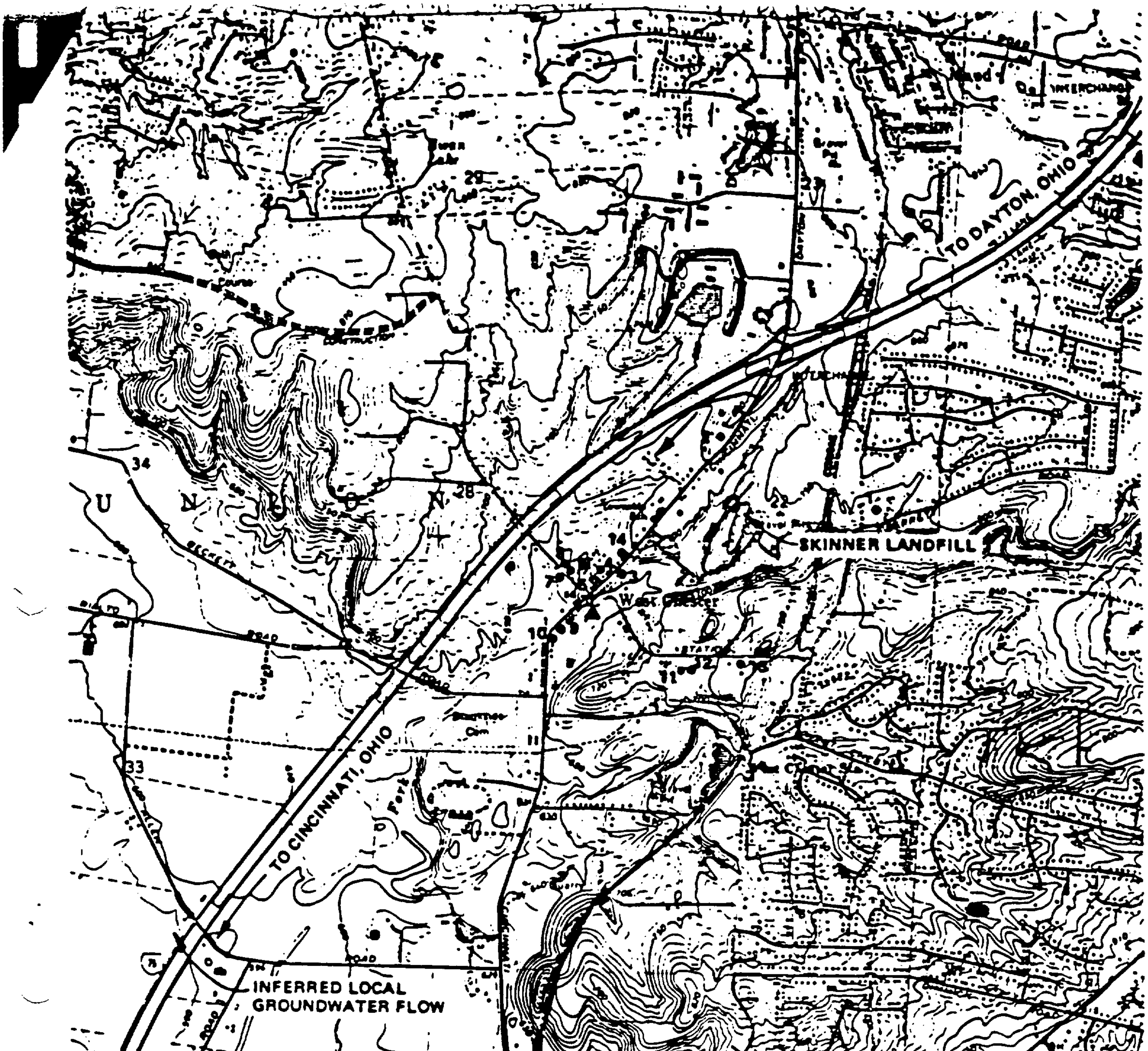
12. Sears
    0-6' clay
    8-100' shale

13. Needham
    0-20' clay
    20-75' rock
    Static level - 30 feet

14. Douglas
    8819 Cin-Day Road
    Sampled 5/3/76
    Source: Hosler/1982

GLT420/11

Source: REPORT OF GEOLOGY AND GROUNDWATER RESOURCES, WEST CHESTER, BUTLER COUNTY, OHIO ; JEFFREY L. HOSLER - OEPA / SWDO



LEGEND

● RESIDENTIAL WELL LOCATION

▲ STREAM SAMPLING POINT

SOURCE: U.S.G.S. 7.5' GLENDALE, OHIO QUADRANGLE.

FIGURE 2-4
LOCATION OF KNOWN RESIDENTIAL WELLS
SKINNER LANDFILL

Source: Skinner Landfill Site - Remedial Action Master Plan
May 18, 1983, CH2M-Hill

APPENDIX A-3

Waste in Lagoon

5-11-76

Table 2-2
QUANTITATIVE RESULTS OF LABORATORY ANALYSIS
PIT OOZE AND BARREL LIQUID
SKINNER LANDFILL

Collection Date: May 11, 1976

Constitutent (All results in mg/l)	SAMPLE NUMBER #13750	#13751	#13752	#13753	#13754
Cyanide	6.76	7.5	0.36	5.4	761
Cadmium	755	180	2.0	5.6	50
Chromium (total)	160	65	4.0	350	126
Lead (total)	1,050	285	--	1,370	554
Mercury (total)	0.047	0.0135	0.006	0.01	0.075
Zinc	480	165	20.0	420	325
Copper	185	129	2.1	269	1,840
Phenol	27.3	24	12.8	8.8	11.2

The above samples were tested at the U.S. EPA Cincinnati Lab.

	#13750	#13751
Cyanide	9.1	7.7

The sample above was tested at the ODH Lab.

Identification of samples

#13750 - Liquid in pit (black color)
#13751 - Liquid in pit (orange color)
#13752 - Barrel recovered from pit
#13753 - Barrel recovered from pit
#13754 - Barrel recovered from pit

GLI420/7

Results on Laboratory Analysis of Samples Collected

@Skinner Landfill, Union Twp., Butler County

Date of Collection: May 11, 1976

Identification of samples (ODH lab number)

#13750-Liquid in pit (black color)
#13751-Liquid in pit (orange color)
#13752-Barrel recovered from pit
#13753-Barrel recovered from pit
#13754-Barrel recovered from pit

Constituent (All results in mg/l(ppm))	#13750	#13751	#13752	#13753	#13754
Cyanide	6.76	7.5	0.36	5.4	761
Cadmium	755	180	2.0	5.6	50
Chromium(total)	160	65	4.0	350	126
Lead(total)	1050	285	—	1370	554
Mercury(total)	0.047	0.0135	0.006	0.01	0.075
Zinc	480	165	20.0	420	325
Copper	185	129	2.1	269	1840
Phenol	27.3	24	12.8	8.8	11.2

U.S.EPA (Cincinnati lab)

	#13750	#13751
Cyanide	9.1 mg/l	7.7 mg/l

Qualitative determination by gas chromotography-Mass Spectrophotometry process of the constituents in the liquid from Skinner landfill (U.S.EPA Lab-Cincinnati)
Comment: major portion of "ooze" is composed of pesticide intermediate Compounds: compounds from which pesticides are formulated, and are in their own right toxic.

Trichloropropane
Dichlorobenzene
1, 3 Hexachlorobutadiene (Aldrin Component)
Naphthalene (A major Component)
Hexachlorocyclopentadiene
Methyl Napthalene (Two Isomers)
Iso-Butyl Benzolate
HexachloroNor-Bornadine (Endrin Intermediate)
Octachloro-cyclo-pentene (The major component, chlordane intermediate)
Heptachlor-nor-borene (Major component-possibly heptachlor intermediate)
Hexachlorbenzene (Major Component)
Chlordene (Chlordane Derivative?)
Methyl Benzyl Phenone
Octachlor penta fulvalene

RECEIVE[illegible]

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY [illegible]

CINCINNATI, OHIO 45268

[illegible] Protection Agency

ENVIRONMENTAL MONITORING AND
SUPPORT LABORATORY - CINCINNATI

June 4, 1976

Mr. John E. Richards
Ohio Environmental Protection Agency
Post Office Box 1049
Columbus, Ohio 43216

Dear Mr. Richards:

As requested by telephone on May 19, 1976, we have analyzed the samples delivered to us by Mr. Ken Harsh on May 20. The results of our examinations to this date are:

Sample Identification	Analytical Result
#76-18-#1 Pit Trench	Total cyanide - 9.1 mg/kg (wet weight)

Organic compounds found and identified:

trichloropropane
dichlorobenzene
1,3-hexachlorobutadiene
naphthalene - a major component
hexachlorocyclopentadiene
methyl naphthalene (2 isomers)
isobutyl benzoate
hexachloronorbornadiene
octachlorocyclopentene - the major component
heptachloronorbornene - a major component
hexachlorobenzene - a major component
chlordene - a major component
methyl benzophenone
octachloropentafulvalene

#76-19-#2 Pit Trench	Total cyanide = 7.7 mg/kg

Organic compounds found and identified:

trichloropropane
dichlorobenzene
1,3-hexachlorobutadiene

naphthalene	- a major component
hexachlorocyclopentadiene	
methyl naphthalene (2 isomers)	
isobutyl benzoate	
hexachloronorbornadiene	
octachlorocyclopentene	- the major component
heptachloronorbornene	- a major component
hexachlorobenzene	- a major component
chlordene	- a major component
methyl benzophenone	
octachloropentafulvalene	
benzoic acid	

The samples are being held under Chain of Custody procedures for further analyses and submission as evidence if required.

Sincerely yours,

Dwight G. Ballinger

Dwight G. Ballinger
Director
Environmentl Monitoring and Support Laboratory - Cincinnati

cc: Dr. Edward Glod, Ohio EPA

APPENDIX A-4

Surface Water Downstream

5-25-76

OHIO DEPARTMENT OF HEALTH
WATER QUALITY DATA

(7)

R[illegible]eived: 5-25-76

Reported: ~~[illegible]~~ 6-7-76

Laboratory: INDUSTRIAL

Laboratory Number: 2911

Analyst: Daniel M. Bunder

[illegible]ion: West Chester, Ohio

Station Code:

County: Butler

Collected by: J.L. Hosler

Phone: 461-46[illegible]

[Ident]ification of Sample: [S]tream Below Skinner Prop.

Sample Code:

Date of grab sample (or last date of composite sample): Year 76 Month 05 Day 25 Hour 10 Minute 00

Composite Type:

[Sam]ple Types: ☐ Ground Water ☐ Industrial ☐ Sewage ☐ Comp Mon ☐ Water Supply ☒ Stream

Beginning Date of Composite Sample: Year Month Day C Hour Minute

Frequency:

[Anal]ys[es] to be Reported to: ☐ CO ☐ CDO ☐ SE ☐ NE ☒ SW ☐ NW

[REA]SON FOR TAKING SAMPLE — ADDITIONAL INFORMATION — REMARKS BY ANALYST:
[PRE]SERVATIVE:
[illegible]
OTHER

run ~~organic~~ Pesticide scan

Parameter	Code	Result
mg/l ☐ Cyanide CN	N1	
mg/l ☐ MBAS	N2	
mg/l ☐ Oil-Grease, Total	N3	
mg/l ☐ Phenols	N4	
mg/l ☐ Tannin Lignin	N5	
ug/l ☐ Aldrin, Whl Smpl	N6	0.00
ug/l ☐ DDD, Whl Smpl	N7	0.00
ug/l ☐ DDE, Whl Smpl	N8	0.00
ug/l ☐ DDT, Whl Smpl	N9	0.00
ug/l ☐ Dieldrin, Whl Smpl	N0	0.00
ug/l ☐ Chlordane, Whl Smpl	M1	0.00
ug/l ☐ Endrin, Whl Smpl	M2	0.00
ug/l ☐ Heptachlor, Whl Smpl	M3	0.00
ug/l ☐ Heptachlor-Epoxide, Whl Smpl	M4	0.00
ug/l ☐ Lindane, Whl Smpl	M5	0.00
ug/l ☐ Methoxychlor, Whl Smpl	M6	0.00
ug/l ☐ Malathion, Whl Smpl	M7	0.00
ug/l ☐ Parathion, Whl Smpl	M8	0.00
ug/l ☐ Methyl Parathion, Whl Smpl	M9	0.00
☐ Beta Total		
☐ Beta Diss		
☐ Beta Susp		
☐ Alpha Total		
☐ Radium 226 Total		
☐ Strontium 90 Total		
☐ Coliform Total MF		
☐ Coliform Total MPN, Conf		
☐ Fecal Coli Total, MF		
☐ Fecal Strep Total, MF		
☐ Plate Count Total		
☐ Algae Total		
☐ TOD		
☐ BHC		
☐ TAN		
☐ Conductivity Field		
mg/l Kelthane		0.00

Parameter	Code
☐ Fluoride Diss. F	H1
CFS ☐ Calcium Total Ca	H2
☐ Magnesium Total Mg	H3
S.U. ☐ Potassium Total K	H4
mg/l ☐ Sodium Total Na	H5
mg/l ☐ Aluminum Total Al	H6
mg/l ☐ Antimony Total Sb	H7
mg/l ☐ Arsenic Total As	H8
☐ Barium Total Ba	H9
☐ Beryllium Total Be	H0
☐ Bismuth Total Bi	J1
☐ Boron Total B	J2
S.U. ☐ Cadmium Total Cd	J3
S.U. ☐ Chromium Total Cr	J4
mg/l ☐ Chromium Hex Cr	J5
mg/l ☐ Cobalt Total Co	J6
mg/l ☐ Copper Total Cu	J7
mg/l ☐ Iron Total Fe	J8
mg/l ☐ Iron Diss Fe	J9
mg/l ☐ Iron Ferrous Fe	J0
mg/l ☐ Lead Total Pb	K1
mg/l ☐ Lithium Total Li	K2
mg/l ☐ Manganese Total Mn	K3
mg/l ☐ Mercury Total Hg	K4
mg/l ☐ Molybdenum Total Mo	K5
mg/l ☐ Nickel Total Ni	K6
mg/l ☐ Selenium Total Se	K7
mg/l ☐ Silver Total Ag	K8
mg/l ☐ Strontium Total Sr	K9
mg/l ☐ Thallium Total Tl	K0
mg/l ☐ Tin Total Sn	L1
mg/l ☐ Titanium Total Ti	L2
mg/l ☐ Tungsten Total W	L3
mg/l ☐ Vanadium Total V	L4
mg/l ☐ Zinc Total Zn	L5
mg/l ☐ Zirconium Total Zr	L6
mg/l ☐ BOD, 5 Day	L7
mg/l ☐ COD	L8

APPENDIX A-5

Leachate and Surface Water

7-25-77

7-26-77

Reported 8-1-77

OHIO DEPARTMENT OF HEALTH
WATER QUALITY DATA

Laboratory 14

Laboratory Number 20473

Analyst T.G. 8/1/77

Station Code ☐☐☐☐☐

County Butler

Collected by: Ken Harris   Phone:

Leachate Puddle

Identification of Sample: @ Skinner Land Fill

Sample Code ☐

Date of grab sample (or last date of composite sample): Year 77 Month 07 Day 25 Hour 11 Minute 45   Composite Type ☐☐

Sample Types: ☐ Ground Water ☒ Industrial ☐ Sewage ☐ Comp Mon ☐ Water Supply ☐ Stream

Beginning Date of Composite Sample: Year ☐ Month ☐ Day ☐ C Hour ☐ Minute ☐   Frequency ☐☐

Analysis to be Reported to: ☐ CO ☐ CDO ☐ SE ☐ NE ☒ SW ☐ NW

REASON FOR TAKING SAMPLE — ADDITIONAL INFORMATION — REMARKS BY ANALYST:

PRESERVATIVE: NaOH, CuSO4, H2SO4, HNO3, OTHER

Arsenic show considerable interferences. by dilution techni[que] it is shown that As < 2000 ppb. T.G.

AUG 2 REC'D

Parameter (or indicate by checking boxes)	Code	Value	Unit	Parameter	Code	Value	Unit	Parameter	Code	Value	Unit
				☐ Fluoride Diss. F	H1		mg/l	☒ ~~Cyanide~~ CN	N1		
F[illegible]	Y2		CFS	☐ Calcium Total Ca	H2		mg/l	☐ MBAS	N2		
Water Temperature, Field	Y3		C°	☐ Magnesium Total Mg	H3		mg/l	☐ Oil-Grease, Total	N3		
pH, Field	Y4		S.U	☐ Potassium Total K	H4		mg/l	☒ Phenols	N4	<2	
Dissolved Oxygen, Field	Y5		mg/l	☐ Sodium Total Na	H5		mg/l	☐ Tannin Lignin	N5		
Hydrogen Sulfide, Field	Y6		mg/l	☐ Aluminum Total Al	H6		ug/l	☐ Aldrin, Whl Smpl	N6		
Chlorine Free Avl. Field	Y7		mg/l	☐ Antimony Total Sb	H7		ug/l	☐ DDD, Whl Smpl	N7		
Chlorine Tot Resid Field	Y8		mg/l	☒ Arsenic Total As	H8	interference	ug/l	☐ DDE, Whl Smpl	N8		
Co[illegible]	Y9		Pt-Co	☐ Barium Total Ba	H9		ug/l	☐ DDT, Whl Smpl	N9		
Od[illegible]	Y0		T.N.	☐ Beryllium Total Be	H0		ug/l	☐ Dieldrin, Whl Smpl	N0		
Turbidity	U1	1500	FTU	☐ Bismuth Total Bi	J1		ug/l	☐ Chlordane, Whl Smpl	M1		
Conductivity at 25 C°	U2	30000	U-MHO	☐ Boron Total B	J2		ug/l	☐ Endrin, Whl Smpl	M2		
pH, Lab	U3	6.98	S.U	☒ Cadmium Total Cd	J3	598	ug/l	☐ Heptachlor, Whl Smpl	M3		
pH, CaCO3 Stability	U4		S.U	☒ Chromium Total Cr	J4	120	ug/l	☐ Hchlr-Epoxide, Whl Smpl	M4		
Alkalinity Total CaCO3	U5		mg/l	☐ Chromium Hex. Cr	J5		ug/l	☐ Lindane, Whl Smpl	M5		
Alkalinity Phth CaCO3	U6		mg/l	☐ Cobalt Total Co	J6		ug/l	☐ Methoxychlor, Whl Smpl	M6		
Alkalinity CaCO3 Stabl	U7		mg/l	☒ Copper Total Cu	J7	260	ug/l	☐ Malathion, Whl Smpl	M7		
Carbon Dioxide CO2	U8		mg/l	☐ Iron Total Fe	J8		ug/l	☐ Parathion, Whl Smpl	M8		
Acidity Total CaCO3	U9		mg/l	☐ Iron Diss. Fe	J9		ug/l	☐ Methyl Paratim, Whl Smpl	M9		
Acidity M.O. CaCO3	U0		mg/l	☐ Iron Ferrous Fe	J0		ug/l	☐ Beta, Total	M0		
Hardness Total CaCO3	I1		mg/l	☒ Lead Total Pb	K1	55	ug/l	☐ Beta, Diss	.1		
Residue Total	I2	41100	mg/l	☐ Lithium Total Li	K2		ug/l	☐ Beta, Suspd	.2		
Residue Total Volatile	I3		mg/l	☐ Manganese Total Mn	K3		ug/l	☐ Alpha, Total	.3		
Residue, Total Filt (Sus)	I4		mg/l	☒ Mercury Total Hg	K4	<1	ug/l	☐ Alpha, Diss	.4		
Residue Vol Filt	I5		mg/l	☐ Molybdenum Total Mo	K5		ug/l	☐ Alpha, Suspd	.5		
Residue Total Filt (Diss)	I6		mg/l	☐ Nickel Total Ni	K6		ug/l	☐ Radium 226, Total	.6		
Residue Vol Filt	I7		mg/l	☐ Selenium Total Se	K7		ug/l	☐ Strontium 90, Total	.7		
Residue Settable	I8		mg/l	☐ Silver Total Ag	K8		ug/l	☐ Coliform Total, MF	.8		#/100
Nitrogen Organic N	I9		mg/l	☐ Strontium Total Sr	K9		ug/l	☐ Coliform Total MPN, Conf	.9		#/100
Nitrogen Ammonia N	I0		mg/l	☐ Thallium Total Tl	K0		ug/l	☐ Fecal Coli Total, MF	.0		#/100
[illegible] N	C1		mg/l	☐ Tin Total Sn	L1		ug/l	☐ Fecal Strep Total MF	.1		#/100
[illegible] N	C2		mg/l	☐ Titanium Total Ti	L2		ug/l	☐ Plate Count, Total	.2		#/ml
Phosphorus Total P	O3		mg/l	☐ Tungsten Total T	L3		ug/l	☐ Algae, Total	.3		
Phosphorus Soluble P	O4		mg/l	☐ Vanadium Total V	L4		ug/l	☐ TOD	.4		mg/l
Phosphate Total PO4	O5		mg/l	☒ Zinc Total Zn	L5	240	ug/l	☐ BHC	.5		
Phosphate Ortho PO4	O6		mg/l	☐ Zirconium Total Zr	L6		ug/l	☐ TKN	.6		mg/l
Sulfate SO4	O7		mg/l	☒ ~~BOD~~ 5-Day	L7		mg/l	☐ Conductivity, Field	.7		U-MHO
S[illegible] SO3	O8		mg/l	☒ COD	L8	17600	mg/l	☐			
S[illegible] S	O9		mg/l	☐ Chlorine Demand, 15 min	L9		mg/l	☐			
Chloride Cl	O0	86[illegible]		☐ Carbon Total Org C	L0						

OHIO DEPARTMENT OF HEALTH
WATER QUALITY DATA

Laboratory Number: P-5194

Reported: 8-4-77

Laboratory: Industrial Chem.

Analyst: Daniel M. Binder

Station Code: | | | | |

County: Butler

Collected by: Ken Harsh

Phone:

Leachate Puddle

Identification of Sample: @ Fehner Landfill

Sample Code:

Date of grab sample (or last date of composite sample): Year 77 Month 07 Day 25 Hour 11 Minute 4?

Composite Type:

Sample Types: ☐ Ground Water ☒ Industrial ☐ Sewage ☐ Comp Mon ☐ Water Supply ☐ Stream

Beginning Date of Composite Sample: Year Month Day Hour Minute — Frequency

Analysis to be Reported to: ☐ CO ☐ CDO ☐ SE ☐ NE ☒ SW ☐ NW

REASON FOR TAKING SAMPLE — ADDITIONAL INFORMATION — REMARKS BY ANALYST:

PRESERVATIVE:
NaOH
$CuSO_4$
H_2SO_4
HNO_3
OTHER

Organic I.D./Rush Results by 7/29/77

Parameter (or indicate by checking boxes)	Code	Result	Units
Flow	Y2		CFS
Water Temperature, Field	Y3		C°
pH, Field	Y4		S. U.
Dissolved Oxygen, Field	Y5		mg/l
Hydrogen Sulfide, Field	Y6		mg/l
Chlorine Free Avl, Field	Y7		mg/l
Chlorine Tot Resd, Field	Y8		mg/l
Color	Y9		Pt-Co
Odor	Y0		T. N.
Turbidity	U1		FTU
Conductivity at 25 C°	U2		U-MHO
pH, Lab	U3		S U
pH $CaCO_3$ Stability	U4		S U
Alkalinity Total $CaCO_3$	U5		mg/l
Alkalinity Phth. $CaCO_3$	U6		mg/l
Alkalinity $CaCO_3$ Stabl	U7		mg/l
Carbon Dioxide CO_2	U8		mg/l
Acidity Total $CaCO_3$	U9		mg/l
Acidity M.O. $CaCO_3$	U0		mg/l
Hardness Total $CaCO_3$	I1		mg/l
Residue, Total	I2		mg/l
Residue, Total Volatile	I3		mg/l
Residue, Total Nflt (Susp)	I4		mg/l
Residue, Vol Nflt	I5		mg/l
Residue, Total Flt (Diss)	I6		mg/l
Residue, Vol Flt	I7		mg/l
Residue, Settlable	I8		mg/l
Nitrogen Organic, N	I9		mg/l
Nitrogen Ammonia, N	I0		mg/l
Nitrite, N	01		mg/l
Nitrate, N	02		mg/l
Phosphorus Total, P	03		mg/l
Phosphorus Soluble, P	04		mg/l
Phosphate Total, PO_4	05		mg/l
Phosphate Ortho, PO_4	06		mg/l
Sulfate, SO_4	07		mg/l
Sulfite, SO_3	08		mg/l
Sulfide, S	09		mg/l
Chloride, Cl	00		mg/l

Parameter	Code	Result	Units
☐ Fluoride Diss. F	H1		mg/l
☐ Calcium Total, Ca	H2		mg/l
☐ Magnesium Total, Mg	H3		mg/l
☐ Potassium Total, K	H4		mg/l
☐ Sodium Total, Na	H5		mg/l
☐ Aluminum Total, Al	H6		ug/l
☐ Antimony Total, Sb	H7		ug/l
☐ Arsenic Total, As	H8		ug/l
☐ Barium Total, Ba	H9		ug/l
☐ Beryllium Total, Be	H0		ug/l
☐ Bismuth Total, Bi	J1		ug/l
☐ Boron Total, B	J2		ug/l
☐ Cadmium Total, Cd	J3		ug/l
☐ Chromium Total, Cr	J4		ug/l
☐ Chromium Hex, Cr	J5		ug/l
☐ Cobalt Total, Co	J6		ug/l
☐ Copper Total, Cu	J7		ug/l
☐ Iron Total, Fe	J8		ug/l
☐ Iron Diss, Fe	J9		ug/l
☐ Iron Ferrous, Fe	J0		ug/l
☐ Lead Total, Pb	K1		ug/l
☐ Lithium Total, Li	K2		ug/l
☐ Manganese Total, Mn	K3		ug/l
☐ Mercury Total, Hg	K4		ug/l
☐ Molybdenum Total, Mo	K5		ug/l
☐ Nickel Total, Ni	K6		ug/l
☐ Selenium Total, Se	K7		ug/l
☐ Silver Total, Ag	K8		ug/l
☐ Strontium Total, Sr	K9		ug/l
☐ Thallium Total, Tl	K0		ug/l
☐ Tin Total, Sn	L1		ug/l
☐ Titanium Total, Ti	L2		ug/l
☐ Tungsten Total, T	L3		ug/l
☐ Vanadium Total, V	L4		ug/l
☐ Zinc Total, Zn	L5		ug/l
☐ Zirconium Total, Zr	L6		ug/l
☐ BOD, 5-Day	L7		mg/l
☐ COD	L8		mg/l
☐ Chlorine Demand, 15 min	L9		mg/l
☐ Carbon Total Org. C	L0		mg/l

Parameter	Code	Result	Units
☐ Cyanide, CN	N1		mg/l
☐ MBAS	N2		mg/l
☐ Oil-Grease, Total	N3		mg/l
☐ Phenols	N4		ug/l
☐ Tannin Lignin	N5		mg/l
☐ Aldrin, Whl Smpl	N6	<1	ug/l
☐ DDD, Whl Smpl	N7	<1	ug/l
☐ DDE, Whl Smpl	N8	<1	ug/l
☐ DDT, Whl Smpl	N9	1.5	ug/l
☐ Dieldrin, Whl Smpl	N0	<5	ug/l
☐ Chlordane, Whl Smpl	M1	<5	ug/l
☐ Endrin, Whl Smpl	M2	<1	ug/l
☐ Heptachlor, Whl Smpl	M3	<1	ug/l
☐ Hchlr-Epoxide, Whl Smpl	M4	<1	ug/l
☐ Lindane, Whl Smpl	M5	<1	ug/l
☐ Methoxychlor, Whl Smpl	M6	<5	ug/l
☐ Malathion, Whl Smpl	M7	<5	ug/l
☐ Parathion, Whl Smpl	M8	<5	ug/l
☐ Methyl Parathn, Whl Smpl	M9	<5	ug/l
☐ Beta, Total	M0		pc/l
☐ Beta Diss	.1		pc/l
☐ Beta Suspd	.2		pc/l
☐ Alpha, Total	.3		pc/l
☐ Alpha, Diss	.4		pc/l
☐ Alpha, Suspd	.5		pc/l
☐ Radium 226, Total	.6		pc/l
☐ Strontium 90, Total	.7		pc/l
☐ Coliform Total, MF	.8		#/100ml
☐ Coliform Total MPN, Conf	.9		#/100ml
☐ Fecal Coli Total, MF	.0		#/100ml
☐ Fecal Strep Total, MF	.1		#/100ml
☐ Plate Count, Total	.2		#/ml
☐ Algae, Total	.3		#/ml
☐ TOD	.4		mg/l
☐ BHC	.5	<.5	ug/l
☐ TKN	.6		mg/l
☐ Conductivity, Field	.7		U-MHO
☒ PCB		45 ug/l	
☐			
☐			

OHIO DEPARTMENT OF HEALTH
WATER QUALITY DATA

...ed: 7-27-77
Reported: 8-11-77
Laboratory: IS
ww20
Laboratory Number: 20485
Analyst: 8/11/77 T.G.

Station Code:
County: Butler
Collected by: Ken Hayes A
Phone:

...: Unnamed trib. to E Branch Mill Creek

...ification of Sample: Kinnee Landfill - downstream
Sample Code:

Date of grab sample (or last date of composite sample): Year 77 Month 07 Day 25 Hour 11 Minute 30
Composite Type:

...types: ☐ Ground Water ☐ Industrial ☐ Sewage ☐ Comp Mon ☐ Water Supply ☒ Stream

Beginning Date of Composite Sample: Year Month Day C Hour Minute
Frequency

...to be Reported to: ☐ CO ☐ CDO ☐ SE ☐ NE ☒ SW ☐ NW

...FOR TAKING SAMPLE — ADDITIONAL INFORMATION — REMARKS BY ANALYST:
...ERVATIVE:
...OH
...S...
...S...
...NC
...THER

Probable Legal Action

AUG 16 REC'D

Parameter	Code	Value	Unit	Parameter	Code	Value	Unit	Parameter	Code	Value	Unit
...plar (or indicate by checking boxes)				☐ Fluoride Diss. F	H1		mg/l	~~[illegible]~~	N1		mg/l
...	Y2		CFS	☐ Calcium Total Ca	H2		mg/l	☐ MBAS	N2		mg/l
...mperature, Field	Y3		C°	☐ Magnesium Total Mg	H3		mg/l	☐ Oil-Grease, Total	N3		mg/l
... Field	Y4		S U	☐ Potassium Total K	H4		mg/l	☒ Phenols	N4	<2	ug/l
...ssolved Oxygen, Field	Y5		mg/l	☐ Sodium Total Na	H5		mg/l	☐ Tannin Lignin	N5		mg/l
...Sulfide, Field	Y6		mg/l	☐ Aluminum Total Al	H6		ug/l	☐ Aldrin, Whl Smpl	N6		ug/l
... Free Amm, Field	Y7		mg/l	☐ Antimony Total Sb	H7		ug/l	☐ DDD, Whl Smpl	N7		ug/l
...lorine Tot Resd Field	Y8		mg/l	☒ Arsenic Total As	H8	<10	ug/l	☐ DDE, Whl Smpl	N8		ug/l
...lor	Y9		Pt-Co	☐ Barium Total Ba	H9		ug/l	☐ DDT, Whl Smpl	N9		ug/l
...lor	Y0		T. R.	☐ Beryllium Total Be	H0		ug/l	☐ Dieldrin, Whl Smpl	N0		ug/l
...rbidity	U1		FTU	☐ Bismuth Total Bi	J1		ug/l	☐ Chlordane, Whl Smpl	M1		ug/l
...vity at 25 C°	U2	820	U-MHO	☐ Boron Total B	J2		ug/l	☐ Endrin, Whl Smpl	M2		ug/l
...	U3	7.8	S U	☒ Cadmium Total Cd	J3	<5	ug/l	☐ Heptachlor, Whl Smpl	M3		ug/l
... CaCO3 Stability	U4		S U	☒ Chromium Total Cr	J4	<30	ug/l	☐ Hchlr-Epoxide, Whl Smpl	M4		ug/l
...y Total CaCO3	U5		mg/l	☐ Chromium Hex. Cr	J5		ug/l	☐ Lindane, Whl Smpl	M5		ug/l
...y Phth. CaCO3	U6		mg/l	☐ Cobalt Total Co	J6		ug/l	☐ Methoxychlor, Whl Smpl	M6		ug/l
... CaCO3 Stabl	U7		mg/l	☒ Copper Total Cu	J7	<30	ug/l	☐ Malathion, Whl Smpl	M7		ug/l
...ide CO2	U8		mg/l	☐ Iron Total Fe	J8		ug/l	☐ Parathion, Whl Smpl	M8		ug/l
... Total CaCO3	U9		mg/l	☐ Iron Diss. Fe	J9		ug/l	☐ Methyl Parathn, Whl Smpl	M9		ug/l
...ity M.O. CaCO3	U0		mg/l	☐ Iron Ferrous Fe	J0		ug/l	☐ Beta Total	M0		pc/l
...ardness Total CaCO3	I1		mg/l	☒ Lead Total Pb	K1	6	ug/l	☐ Beta Diss	.1		pc/l
...esid Total	I2		mg/l	☐ Lithium Total Li	K2		ug/l	☐ Beta Suspd	.2		pc/l
...esidue, Total Volatile	I3		mg/l	☐ Manganese Total Mn	K3		ug/l	☐ Alpha Total	.3		pc/l
...esidue, Total Nflt (Sus)	I4		mg/l	☐ Mercury Total Hg	K4		ug/l	☐ Alpha Diss	.4		pc/l
...esid Vol Nflt	I5		mg/l	☐ Molybdenum Total Mo	K5		ug/l	☐ Alpha Suspd	.5		pc/l
...esid Total Flt (Diss)	I6		mg/l	☐ Nickel Total Ni	K6		ug/l	☐ Radium 226 Total	.6		pc/l
...esidue Vol Flt	I7		mg/l	☐ Selenium Total Se	K7		ug/l	☐ Strontium 90 Total	.7		pc/l
...esid Settable	I8		mg/l	☐ Silver Total Ag	K8		ug/l	☐ Coliform Total MF	.8		#/100ml
... Organic N	I9		mg/l	☐ Strontium Total Sr	K9		ug/l	☐ Coliform Total MPN Conf	.9		#/100ml
...trogen Ammonia N	I0	017	mg/l	☐ Thallium Total Tl	K0		ug/l	☐ Fecal Coli Total MF	.0		#/100ml
... N	01		mg/l	☐ Tin Total Sn	L1		ug/l	☐ Fecal Strep Total MF	.1		#/100ml
... N	02	005	mg/l	☐ Titanium Total Ti	L2		ug/l	☐ Plate Count Total	.2		#/ml
...hosphorus Total P	03	037	mg/l	☐ Tungsten Total W	L3		ug/l	☐ Algae Total	.3		#/ml
...hosphorus Soluble P	04		mg/l	☐ Vanadium Total V	L4		ug/l	☐ TOD	.4		mg/l
...te Total PO4	05		mg/l	☒ Zinc Total Zn	L5	<30	ug/l	☐ BHC	.5		mg/l
...hosphate Ortho PO4	06		mg/l	☐ Zirconium Total Zr	L6		ug/l	☐ TAN	.6		mg/l
...lfate SO4	07		mg/l	☐ BOD, 5-Day	L7		mg/l	☐ Conductivity, Field	.7		U-MHO
...fite SO3	08		mg/l	☐ COD	L8		mg/l	☐			
...fide S	09		mg/l	☐ Chlorine Demand, 15 min	L9		mg/l	☐			
...loride Cl	00	56	mg/l	☒ Carbon Total Org C	L0	<[illegible]		☐			

Table 2-4
LEACHATE PUDDLE

Sample Date: July 25, 1977

Compound	Concentration (mg/l)
Chloride	9,600
Cadmium	598
Chromium	120
Copper	260
Lead	55
Mercury	S 1
Zinc	240
Phenols	S 2

Arsenic levels could not be verified because of interference by dilution.

GLT420/8

Source: Skinner Landfill Site - Remedial Action Master Plan

U.S. ENVIRONMENTAL PROTECTION AGENCY-HWI Sample Management Office
P.O. Box 818, Alexandria, VA 22313 - 703/683-0885

82MG11R12
Sample Number

ORGANICS ANALYSIS DATA SHEET

C#1195-E1408

Laboratory Name Mead CompuChem
Lab Sample ID NO. 18098
QC Report NO. 17-63, 18-74, 27-63

Skinner L. F.
F5-8203-6 #24
Low Water

ACID COMPOUNDS	ug/l
21A 2,4,6-trichlorophenol	ND
22A p-chloro-m-cresol	ND
24A 2-chlorophenol	ND
31A 2,4-dichlorophenol	ND
34A 2,4-dimethylphenol	ND
57A 2-nitrophenol	ND
58A 4-nitrophenol	ND
59A 2,4-dinitrophenol	ND
60A 4,6-dinitro-o-cresol	ND
64A pentachlorophenol	ND
65A phenol	ND

BASE/NEUTRAL COMPOUNDS	ug/l
1B acenaphthene	ND
5B benzidine	ND
8B 1,2,4-trichlorobenzene	ND
9B hexachlorobenzene	ND
12B hexachloroethane	ND
18B bis(2-chloroethyl)ether	NA
20B 2-chloronaphthalene	ND
25B 1,2-dichlorobenzene	ND
26B 1,3-dichlorobenzene	ND
27B 1,4-dichlorobenzene	ND
28B 3,3'-dichlorobenzidine	ND
35B 2,4-dinitrotoluene	ND
36B 2,6-dinitrotoluene	ND
37B 1,2-diphenylhydrazine (as azobenzene)	ND
39B fluoranthene	ND
40B 4-chlorophenyl phenyl ether	ND

BASE/NEUTRAL COMPOUNDS	ug/l
41B 4-bromophenyl phenyl ether	ND
42B bis-(2-chloroisopropyl)ether	ND
43B bis(2-chloroethoxy)methane	ND
52B hexachlorobutadiene	ND
53B hexachlorocyclopentadiene	ND
54B isophorone	ND
55B naphthalene	ND
56B nitrobenzene	ND
61B N-nitrosodimethylamine	NA
62B N-nitrosodiphenylamine	ND
63B N-nitrosodi-n-propylamine	ND
66B bis(2-ethylhexyl)phthalate	ND
67B butyl benzyl phthalate	ND
68B di-n-butyl phthalate	ND
69B di-n-octyl phthalate	ND
70B diethyl phthalate	ND
71B dimethyl phthalate	ND
72B benzo(a)anthracene	ND
73B benzo(a)pyrene	ND
74B 3,4-benzofluoranthene	ND
75B benzo(k)fluoranthene	ND
76B chrysene	ND
77B acenaphthylene	ND
78B anthracene	ND
79B benzo(ghi)perylene	ND
80B fluorene	ND
81B phenanthrene	ND
82B dibenzo(a,h)anthracene	ND
83B indeno(1,2,3-cd)pyrene	ND
84B pyrene	ND

ORGANICS ANALYSIS DATA SHEET-Page 2

Sample Number
C# 1195-E1408

Laboratory Name: Mead CompuChem

Lab Sample ID NO. 18098

QC Report NO. 17-62,119-74,27-63

VOLATILES		ug/l
2V	acrolein	ND
3V	acrylonitrile	ND
4V	benzene	ND
6V	carbon tetrachloride	ND
7V	chlorobenzene	ND
10V	1,2-dichloroethane	ND
11V	1,1,1-trichloroethane	ND
13V	1,1-dichloroethane	ND
14V	1,1,2-trichloroethane	ND
15V	1,1,2,2-tetrachloroethane	ND
16V	chloroethane	ND
19V	2-chloroethylvinyl ether	ND
23V	chloroform	ND
29V	1,1-dichloroethylene	ND
30V	1,2-trans-dichloroethylene	ND
32V	1,2-dichloropropane	ND
33V	1,3-dichloropropylene	ND
38V	ethylbenzene	ND
44V	methylene chloride	ND
45V	methyl chloride	ND
46V	methyl bromide	ND
47V	bromoform	ND
48V	dichlorobromomethane	ND
49V	trichlorofluoromethane	ND
50V	dichlorodifluoromethane	NA
51V	chlorodibromomethane	ND
85V	tetrachloroethylene	ND
86V	toluene	ND
87V	trichloroethylene	ND
88V	vinyl chloride	ND

PESTICIDES		ug/l
89P	aldrin	ND
90P	dieldrin	ND
91P	chlordane	ND
92P	4,4'-DDT	ND
93P	4,4'-DDE	ND
94P	4,4'-DDD	ND
95P	alpha-endosulfan	ND
96P	beta-endosulfan	ND
97P	endosulfan sulfate	ND
98P	endrin	ND
99P	endrin aldehyde	ND
100P	heptachlor	ND
101P	heptachlor epoxide	ND
102P	alpha-BHC	ND
103P	beta-BHC	ND
104P	delta-BHC	ND
105P	gamma-BHC	ND
106P	PCB-1242	ND
107P	PCB-1254	ND
108P	PCB-1221	ND
109P	PCB-1232	ND
110P	PCB-1248	ND
111P	PCB-1260	ND
112P	PCB-1016	ND
113P	toxaphene	ND

DIOXINS		
129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

*Less than 10 ug/l

(pesticides less than, 1ug/l)

ND = NOT DETECTED

18098

) MEAD COMPUCHEM

IT NO: 17602,19-74,27-63

SAMPLE NUMBER
CH1195-E1408

B. TENTATIVELY IDENTIFIED COMPOUNDS

AS #	COMPOUND NAME	FRACTION	$ MAXIMUM SCORE ATTAINED MASS MATCHING ROUTINES (SPECIFY)
	None Found		

APPENDIX A-7

Leachate and Puddle

8-18-77

WW-2

OHIO DEPARTMENT OF HEALTH
WATER QUALITY DATA

...red: 9/19/77

...orted: 9-23-77

Laboratory: [illegible]

Laboratory Number: 21007

Analyst: T.G. 9/22/77

Station Code:

County: Butler

Collected by: Ken HARSH

Phone:

...INNER Landfill

...on of Sample: ...de of landfill leachate

Sample Code:

Date of grab sample (or last date of composite sample): Year 77 Month 08 Day 18 Hour 11 Minute 20

Composite Type:

...ypes: ☐ Ground Water ☐ Industrial ☐ Sewage ☐ Comp Mon ☐ Water Supply ☐ Stream

Beginning Date of Composite Sample: Year Month Day C Hour Minute

Frequency:

...be Reported to: ☐ CO ☐ CDO ☐ SE ☐ NE ☒ SW ☐ NW

...OR TAKING SAMPLE — ADDITIONAL INFORMATION — REMARKS BY ANALYST:

...RVATIVE:

possible Court Case

T.G.

SEP 28 REC'D

(or indicate by checking boxes)	Code	Value	Unit	Parameter	Code	Value	Unit	Parameter	Code	Value	Unit
				☐ Fluoride Diss. F	H1		mg/l	☒ Cyanide, CN	N1	002	mg/l
	Y2		CFS	☐ Calcium Total Ca	H2		mg/l	☐ MBAS	N2		mg/l
...perature, Field	Y3		C°	☐ Magnesium Total Mg	H3		mg/l	☐ Oil-Grease, Total	N3		mg/l
	Y4		S.U	☐ Potassium Total K	H4		mg/l	☒ Phenols	N4	90	ug/l
...ved Oxygen, Field	Y5		mg/l	☐ Sodium Total Na	H5		mg/l	☐ Tannin Lignin	N5		mg/l
Sulfide, Field	Y6		mg/l	☐ Aluminum Total Al	H6		ug/l	☐ Aldrin, Whl Smpl	N6		ug/l
...ree Avl. Field	Y7		mg/l	☐ Antimony Total Sb	H7		ug/l	☐ DDD, Whl Smpl	N7		ug/l
...e Tot Resd. Field	Y8		mg/l	☐ Arsenic Total As	H8		ug/l	☐ DDE, Whl Smpl	N8		ug/l
	Y9		Pt-Co	☐ Barium Total Ba	H9		ug/l	☐ DDT, Whl Smpl	N9		ug/l
	Y0		T.N.	☐ Beryllium Total Be	H0		ug/l	☐ Dieldrin, Whl Smpl	N0		ug/l
...ity	M1		FTU	☐ Bromide Total Br	J1		ug/l	☐ Chlordane, Whl Smpl	M1		ug/l
...ity at 25 C°	M2		U-MHO	☐ Boron Total B	J2		ug/l	☐ Endrin, Whl Smpl	M2		ug/l
	U3	7.0	S U	☒ Cadmium Total Cd	J3	1245	ug/l	☐ Heptachlor, Whl Smpl	M3		ug/l
...CaCO3 Stability	U4		S U	☒ Chromium Total Cr	J4	100	ug/l	☐ Hchlr-Epoxide, Whl Smpl	M4		ug/l
...Total CaCO3	U5		mg/l	☐ Chromium Hex. Cr	J5		ug/l	☐ Lindane, Whl Smpl	M5		ug/l
Phth. CaCO3	U6		mg/l	☐ Cobalt Total Co	J6		ug/l	☐ Methoxychlor, Whl Smpl	M6		ug/l
...Stabl	U7		mg/l	☒ Copper Total Cu	J7	160	ug/l	☐ Malathion, Whl Smpl	M7		ug/l
...Dioxide CO2	U8		mg/l	☒ Iron Total Fe	J8	39000	ug/l	☐ Parathion, Whl Smpl	M8		ug/l
...tal CaCO3	U9		mg/l	☐ Iron Diss. Fe	J9		ug/l	☐ Methyl Parathn, Whl Smpl	M9		ug/l
...to 0. CaCO3	U0		mg/l	☐ Iron Ferrous Fe	J0		ug/l	☐ Beta, Total	M0		pc/l
...ess Total CaCO3	I1		mg/l	☒ Lead Total Pb	K1	44	ug/l	☐ Beta, Diss	.1		pc/l
...Total	I2	30060		...thium Total Li	K2		ug/l	☐ Beta, Suspd	.2		pc/l
...Total Volatile	I3			...nganese Total Mn	K3	147000	ug/l	☐ Alpha, Total	.3		pc/l
...e, Total Nfr (Sus)	I4			...ury Total Hg	K4	1.8	ug/l	☐ Alpha, Diss	.4		pc/l
Vol Nfr	I5			...enum Total Mo	K5		ug/l	☐ Alpha, Suspd	.5		pc/l
Total Flt (D...				...tal Ni	K6		ug/l	☐ Radium 226, Total	.6		pc/l
				...otal Se	K7		ug/l	☐ Strontium 90, Total	.7		pc/l
				...Ag	K8		ug/l	☐ Coliform Total MF	.8		#/100ml
				...Sr	K9		ug/l	☐ Coliform Total MPN, Conf	.9		#/100ml
				...T	K0		ug/l	☐ Fecal Coli Total MF	.0		#/100ml
					L1		ug/l	☐ Fecal Strep Total MF	.1		#/100ml
					L2		ug/l	☐ Plate Count, Total	.2		#/ml
...phos				...Total T	L3		ug/l	☐ Algae, Total	.3		#/ml
...phorus				☐ Vanadium Total V	L4		ug/l	☐ 100	.4		mg/l
				☒ Zinc Total Zn	L5	220	ug/l	☐ BHC	.5		ug/l
...phate Ort...			mg/l	☐ Zirconium Total Zr	L6		ug/l	☐ TKN	.6		mg/l
...e, SO4		32	mg/l	☐ BOD, 5-Day	L7		mg/l	☐ Conductivity, Field	.7		U-MHO
...SO3			mg/l	☒ COD	L8	9350	mg/l	☐			
...S	09		mg/l	☐ Chlorine Demand, 15 min	L9		mg/l	☐			
...ride, Cl	00	8200	mg/l	☐ Carbon Total Org. C	L0		mg/l	☐			

h-L [illegible]

8/19/77

...ted 9-23-77

OHIO DEPARTMENT OF HEALTH
WATER QUALITY DATA

Laboratory 18

Laboratory Number 21008

Analyst T.G. 9/22/77

Station Code

Skinner Landfill

County Butler

Collected by: Ken Harin

Phone:

...tion of Sample: ...le on top of fill near Lagoon Area

Sample Code

Date of grab sample (or last date of composite sample)	Year	Month	Day	Hour	Minute	Composite Type
	77	08	16	12	20	

...pes: ☐ Ground Water ☐ Industrial ☐ Sewage ☐ Comp Mon ☐ Water Supply ☐ Stream

Beginning Date of Composite Sample	Year	Month	Day	Hour	Minute	Frequency
			C			

...s to be Reported to: ☐ CO ☐ CDO ☐ SE ☐ NE ☒ SW ☐ NW

...) FOR TAKING SAMPLE — ADDITIONAL INFORMATION — REMARKS BY ANALYST:
...RVATIVE:
...OH
...SO4
...R

possible Court Case
T.G.

SEP 28 REC'D

(or indicate by checking boxes)											
				☐ Fluoride Diss. F	H1		mg/l	☐ Cyanide, CN	N1		mg/l
	Y2		CFS	☐ Calcium Total, Ca	H2		mg/l	☐ MBAS	N2		mg/l
...emperature, Field	Y3		C°	☐ Magnesium Total, Mg	H3		mg/l	☐ Oil-Grease, Total	N3		mg/l
...	Y4		S.U.	☐ Potassium Total, K	H4		mg/l	☒ Phenols	N4	24	ug/l
...lved Oxygen, Field	Y5		mg/l	☐ Sodium Total, Na	H5		mg/l	☐ Tannin Lignin	N5		mg/l
...n Sulfide, Field	Y6		mg/l	☐ Aluminum Total, Al	H6		ug/l	☐ Aldrin, Whl Smpl	N6		ug/l
... Free Avl. Field	Y7		mg/l	☐ Antimony Total, Sb	H7		ug/l	☐ DDD, Whl Smpl	N7		ug/l
...rine Tot Resd. Field	Y8		mg/l	☐ Arsenic Total, As	H8		ug/l	☐ DDE, Whl Smpl	N8		ug/l
	Y9		Pt-Co	☐ Barium Total, Ba	H9		ug/l	☐ DDT, Whl Smpl	N9		ug/l
	Y0		T.N.	☐ Beryllium Total, Be	H0		ug/l	☐ Dieldrin, Whl Smpl	N0		ug/l
...idity	U1		FTU	☐ Bismuth Total, Bi	J1		ug/l	☐ Chlordane, Whl Smpl	M1		ug/l
...ctivity at 25 C°	U2		u-MHO	☐ Boron Total, B	J2		ug/l	☐ Endrin, Whl Smpl	M2		ug/l
	U3		S.U.	☒ Cadmium Total, Cd	J3	<20	ug/l	☐ Heptachlor, Whl Smpl	M3		ug/l
CaCO3 Stability	U4		S.U.	☒ Chromium Total, Cr	J4	90	ug/l	☐ Hchlr-Epoxide, Whl Smpl	M4		ug/l
...inity Total CaCO3	U5		mg/l	☐ Chromium Hex. Cr	J5		ug/l	☐ Lindane, Whl Smpl	M5		ug/l
...ty Phth. CaCO3	U6		mg/l	☐ Cobalt Total, Co	J6		ug/l	☐ Methoxychlor, Whl Smpl	M6		ug/l
...CO3 Stabl	U7		mg/l	☒ Copper Total, Cu	J7	325	ug/l	☐ Malathion, Whl Smpl	M7		ug/l
...bon Dioxide, CO2	U8		mg/l	☒ Iron Total, Fe	J8	39000	ug/l	☐ Parathion, Whl Smpl	M8		ug/l
... Total, CaCO3	U9		mg/l	☐ Iron Diss. Fe	J9		ug/l	☐ Methyl Parathn, Whl Smpl	M9		ug/l
..., M.O., CaCO3	U0		mg/l	☐ Iron Ferrous, Fe	J0		ug/l	☐ Beta, Total	M0		pc
...dness Total CaCO3	I1		mg/l	☒ Lead Total, Pb	K1	500	ug/l	☐ Beta, Diss	.1		pc
... Total	I2		mg/l	☐ Lithium Total, Li	K2		ug/l	☐ Beta, Suspd	.2		pc
..., Total Volatile	I3		mg/l	☒ Manganese Total, Mn	K3	12200	ug/l	☐ Alpha, Total	.3		pc
...idue, Total Filt (Sus)	I4		mg/l	☒ Mercury Total, Hg	K4	1.9	ug/l	☐ Alpha, Diss	.4		pc
..., Vol Filt	I5		mg/l	☐ Molybdenum Total, Mo	K5		ug/l	☐ Alpha, Suspd	.5		pc
..., Total Flt (Diss)	I6	8246	mg/l	☐ Nickel Total, Ni	K6		ug/l	☐ Radium 226, Total	.6		pc
...idue, Vol Flt	I7		mg/l	☐ Selenium Total, Se	K7		ug/l	☐ Strontium 90, Total	.7		pc
..., Settable	I8		mg/l	☐ Silver Total, Ag	K8		ug/l	☐ Coliform Total, MF	.8		#/100
... Organic, N	I9		mg/l	☐ Strontium Total, Sr	K9		ug/l	☐ Coliform Total MPN, Conf	.9		#/100
...trogen Ammonia, N	I0		mg/l	☐ Thallium Total, Tl	K0		ug/l	☐ Fecal Coli Total, MF	.0		#/100
...rite, N	01		mg/l	☐ Tin Total, Sn	L1		ug/l	☐ Fecal Strep Total, MF	.1		#/100
..., N	02		mg/l	☐ Titanium Total, Ti	L2		ug/l	☐ Plate Count, Total	.2		#/ml
...osphorus Total, P	03		mg/l	☐ Tungsten Total, T	L3		ug/l	☐ Algae, Total	.3		#/ml
...osphorus Soluble, P	04		mg/l	☐ Vanadium Total, V	L4		ug/l	☐ TOD	.4		mg
...ate Total, PO4	05		mg/l	☒ Zinc Total, Zn	L5	755	ug/l	☐ BHC	.5		ug
...ate Ortho, PO4	06		mg/l	☐ Zirconium Total, Zr	L6		ug/l	☐ TKN	.6		mg
...fate, SO4	07		mg/l	☒ BOD, 5-Day	L7	1500	mg/l	☐ Conductivity, Field	.7		U-MHO
..., SO3	08		mg/l	☐ COD	L8		mg/l	☐			
..., S	09		mg/l	☐ Chlorine Demand, 15 min	L9		mg/l	☐			
Chloride, Cl	00	2640	mg/l	☐ Carbon Total Org. C	L0		mg/l	☐			

APPENDIX B

SAMPLING AND ANALYSIS PLAN

SAMPLING AND ANALYSIS PLAN

SKINNER LANDFILL

WEST CHESTER, OHIO

JULY 1985

Prepared for:

U.S. Environmental Protection Agency
Emergency and Remedial Response Branch
Region V
230 S. Dearborn Street
Chicago, Illinois 60604

Document No. 130-WP1-QA-BATT-1
Work Assignment No.: 31-5L73.0

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SAMPLING AND ANALYSIS PLAN
SKINNER LANDFILL, WEST CHESTER, OHIO

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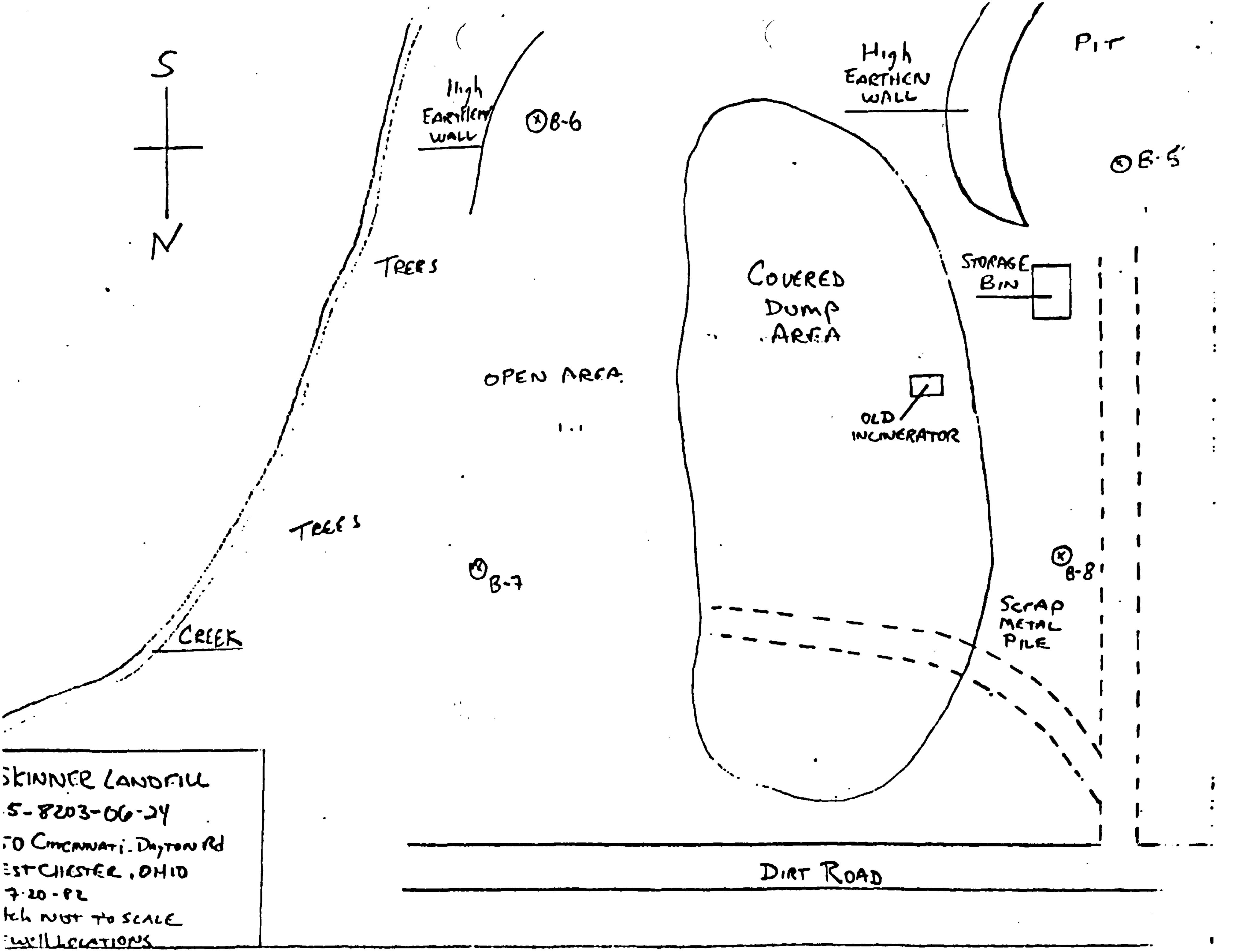
APPENDIX A-6

FIT Monitoring Wells

7-27-82



S
N
High EARTHEN WALL
B-6
High EARTHEN WALL
PIT
B-5
TREES
COVERED Dump AREA
STORAGE BIN
OPEN AREA
OLD INCINERATOR
TREES
B-7
B-8
Scrap METAL PILE
CREEK
DIRT ROAD
KINNER LANDFILL
5-8203-06-24
O Cincinnati-Dayton Rd
EST CHESTER, OHIO
7-20-82
tch NOT TO SCALE
Well LOCATIONS

01-5V73.01015 ~~[illegible]~~ DJB

7-20-82

Skinner Landfill F5-8203-06-24

Case 1195

OTR	ITR	Location		
E1404	ME8754	Well 5	7-27-82	9:30am
E1405	ME 9067	Well 6	7-27-82	9:30am
E1408	ME 9070	Blank	7-27-82	

Wells B-7 and B-8 were dry

Organics shipped to Mead CompuChem

Inorganics shipped to Rocky Mountain Analytical

GENERAL ENFORCEMENT

OEPA

U.S. E...RO...ENT... PR...ECT... AC...CY HW ...mpl... ana... ...ent... ...ice

114 North Co...umbus Street - Alexandria, Virg...ia 22314

Laboratory Name ROCKY MOUNTAIN ANALYTICAL Case No. SAS 223 I QC Report No. 137

1195

Units mg/l or mg/kg (circle one) Skinner L. F. F5-8203-6 #24 Low Water

No.	RMA Sample No.	Ag	Al	B	Ba	Be	Cr	Co	Cu	Fe	Mn	Ni	V	Zn	Zn		
...7251	5055-01	0.030	0.53	N/A	0.35	ND	.055	0.31	ND	8.7	18	0.41	ND	~~0.068~~	0.41	82MG11S6	7
...067	02	0.012	16		0.48	↓	.045	0.19	0.065	55	7.6	0.30	↓	~~0.052~~	0.39	82MG11S6	8
...070	03	ND	ND		ND	↓	ND	ND	ND	0.22	0.055	ND	↓	~~ND~~	0.040	82MG11R	12

Units mg/l or mg/kg (circle one)

TASK 3. Units mg/l or mg/kg (circle one)

No.	RMA Sample No.	As	Cd	Hg	Pb	Sb	Se	Sn	Tl	CN	NH_3	S	
...064	5055-01	ND	0.064	ND	0.54	ND	0.011	ND	ND	ND	N/A		82MG11S67
...067	02	0.018	0.032	0.00033	0.023	↓	ND	↓	↓	↓			82MG11S68
...070	03	ND	0.001	ND	ND	↓	ND	↓	↓	↓			82MG11R12

U.S. ENVIRONMENTAL PROTECTION AGENCY-HWI Sample Management Office
P.O. Box 818, Alexandria, VA 22313 - 703/683-0885

82 MG 11 S 67
Sample Number

ORGANICS ANALYSIS DATA SHEET

CH 1195-E1404

Laboratory Name Mead CompuChem
Lab Sample ID NO. 18099
QC Report NO. 17-62, 18-74, 27-103

Skinner L. F.
F5-8203-6 #24
Low Water

ACID COMPOUNDS		ug/l
21A	2,4,6-trichlorophenol	ND
22A	p-chloro-m-cresol	ND
24A	2-chlorophenol	ND
31A	2,4-dichlorophenol	ND
34A	2,4-dimethylphenol	ND
57A	2-nitrophenol	ND
58A	4-nitrophenol	ND
59A	2,4-dinitrophenol	ND
60A	4,6-dinitro-o-cresol	ND
64A	pentachlorophenol	ND
65A	phenol	ND

BASE/NEUTRAL COMPOUNDS		
1B	acenaphthene	ND
5B	benzidine	ND
8B	1,2,4-trichlorobenzene	ND
9B	hexachlorobenzene	ND
12B	hexachloroethane	ND
18B	bis(2-chloroethyl)ether	NA
20B	2-chloronaphthalene	ND
25B	1,2-dichlorobenzene	ND
26B	1,3-dichlorobenzene	ND
27B	1,4-dichlorobenzene	ND
28B	3,3'-dichlorobenzidine	ND
35B	2,4-dinitrotoluene	ND
36B	2,6-dinitrotoluene	ND
37B	1,2-diphenylhydrazine (as azobenzene)	ND
39B	fluoranthene	ND
40B	4-chlorophenyl phenyl ether	ND

BASE/NEUTRAL COMPOUNDS		ug/l
41B	4-bromophenyl phenyl ether	ND
42B	bis-(2-chloroisopropyl)ether	ND
43B	bis(2-chloroethoxy)methane	ND
52B	hexachlorobutadiene	ND
53B	hexachlorocyclopentadiene	ND
54B	isophorone	ND
55B	naphthalene	ND
56B	nitrobenzene	ND
61B	N-nitrosodimethylamine	NA
62B	N-nitrosodiphenylamine	ND
63B	N-nitrosodi-n-propylamine	ND
66B	bis(2-ethylhexyl)phthalate	ND
67B	butyl benzyl phthalate	ND
68B	di-n-butyl phthalate	ND
69B	di-n-octyl phthalate	ND
70B	diethyl phthalate	ND
71B	dimethyl phthalate	ND
72B	benzo(a)anthracene	ND
73B	benzo(a)pyrene	ND
74B	3,4-benzofluoranthene	ND
75B	benzo(k)fluoranthene	ND
76B	chrysene	ND
77B	acenaphthylene	ND
78B	anthracene	ND
79B	benzo(ghi)perylene	ND
80B	fluorene	ND
81B	phenanthrene	ND
82B	dibenzo(a,h)anthracene	ND
83B	indeno(1,2,3-cd)pyrene	ND
84B	pyrene	ND

ORGANICS ANALYSIS DATA SHEET—Page 2

Sample Number
GH195-E1404

Laboratory Name Mead CompuChem

Lab Sample ID NO. 18099

QC Report NO. 19-62, 18-74, 97-103

2.0 2.2

VOLATILES	ug/l	PESTICIDES	ug/l
2V acrolein	ND	89P aldrin	ND
3V acrylonitrile	ND	90P dieldrin	ND
4V benzene	ND	91P chlordane	ND
6V carbon tetrachloride	ND	92P 4,4'-DDT	ND
7V chlorobenzene	ND	93P 4,4'-DDE	ND
10V 1,2-dichloroethane	ND	94P 4,4'-DDD	ND
11V 1,1,1-trichloroethane	ND	95P alpha-endosulfan	ND
13V 1,1-dichloroethane	ND	96P beta-endosulfan	ND
14V 1,1,2-trichloroethane	ND	97P endosulfan sulfate	ND
15V 1,1,2,2-tetrachloroethane	ND	98P endrin	ND
16V chloroethane	ND	99P endrin aldehyde	ND
19V 2-chloroethylvinyl ether	ND	100P heptachlor	ND
23V chloroform	ND	101P heptachlor epoxide	ND
29V 1,1-dichloroethylene	ND	102P alpha-BHC	ND
30V 1,2-trans-dichloroethylene	ND	103P beta-BHC	ND
32V 1,2-dichloropropane	*	104P delta-BHC	ND
33V 1,3-dichloropropylene	ND	105P gamma-BHC	ND
38V ethylbenzene	ND	106P PCB-1242	ND
44V methylene chloride	ND	107P PCB-1254	ND
45V methyl chloride	ND	108P PCB-1221	ND
46V methyl bromide	ND	109P PCB-1232	ND
47V bromoform	ND	110P PCB-1248	ND
48V dichlorobromomethane	ND	111P PCB-1260	ND
49V trichlorofluoromethane	ND	112P PCB-1016	ND
50V dichlorodifluoromethane	NA	113P toxaphene	ND
51V chlorodibromomethane	ND		
85V tetrachloroethylene	ND	DIOXINS	
86V toluene	ND		
87V trichloroethylene	ND	129B 2,3,7,8-tetrachlorodibenzo-	
88V vinyl chloride	ND	p-dioxin	ND

*Less than 10 ug/l

(pesticides less than, 1ug/l)

ND = NOT DETECTED

ORGANICS ANALYSIS DATA SHEET - Page 4

18079

SAMPLE NUMBER
C#1195-E1404

...me: MEAD COMPUCHEM

...RT NO: 17-43, 17-74, 27-43

B. TENTATIVELY IDENTIFIED COMPOUNDS

CAS #	COMPOUND NAME	FRACTION	% MAXIMUM SCORE ATTAINED MASS MATCHING ROUTINES (SPECIFY)
	NONE FOUND		

RECEIVED ... (1)

U.S. ENVIRONMENTAL PROTECTION AGENCY-HWI Sample Management Office
P.O. Box 818, Alexandria, VA 22313 - 703/683-0885

82MG11568
Sample Number

ORGANICS ANALYSIS DATA SHEET

CH1195-E1405

Laboratory Name Mead CompuChem
Lab Sample ID NO. 18097
QC Report NO. 17-62, 18-74, 27-63

Skinner L. J.
F5-8203-6 #24
Low Water

ACID COMPOUNDS		ug/l
21A	2,4,6-trichlorophenol	ND
22A	p-chloro-m-cresol	ND
24A	2-chlorophenol	ND
31A	2,4-dichlorophenol	ND
34A	2,4-dimethylphenol	ND
57A	2-nitrophenol	ND
58A	4-nitrophenol	ND
59A	2,4-dinitrophenol	ND
60A	4,6-dinitro-o-cresol	ND
64A	pentachlorophenol	ND
65A	phenol	ND

BASE/NEUTRAL COMPOUNDS		ug/l
1B	acenaphthene	ND
5B	benzidine	ND
8B	1,2,4-trichlorobenzene	ND
9B	hexachlorobenzene	ND
12B	hexachloroethane	ND
18B	bis(2-chloroethyl)ether	NA
20B	2-chloronaphthalene	ND
25B	1,2-dichlorobenzene	ND
26B	1,3-dichlorobenzene	ND
27B	1,4-dichlorobenzene	ND
28B	3,3'-dichlorobenzidine	ND
35B	2,4-dinitrotoluene	ND
36B	2,6-dinitrotoluene	ND
37B	1,2-diphenylhydrazine (as azobenzene)	ND
39B	fluoranthene	ND
40B	4-chlorophenyl phenyl ether	ND

BASE/NEUTRAL COMPOUNDS		ug/l
41B	4-bromophenyl phenyl ether	ND
42B	bis-(2-chloroisopropyl)ether	350
43B	bis(2-chloroethoxy)methane	ND
52B	hexachlorobutadiene	ND
53B	hexachlorocyclopentadiene	ND
54B	isophorone	ND
55B	naphthalene	*
56B	nitrobenzene	ND
61B	N-nitrosodimethylamine	NA
62B	N-nitrosodiphenylamine	ND
63B	N-nitrosodi-n-propylamine	ND
66B	bis(2-ethylhexyl)phthalate	ND
67B	butyl benzyl phthalate	ND
68B	di-n-butyl phthalate	ND
69B	di-n-octyl phthalate	ND
70B	diethyl phthalate	*
71B	dimethyl phthalate	ND
72B	benzo(a)anthracene	ND
73B	benzo(a)pyrene	ND
74B	3,4-benzofluoranthene	ND
75B	benzo(k)fluoranthene	ND
76B	chrysene	ND
77B	acenaphthylene	ND
78B	anthracene	ND
79B	benzo(ghi)perylene	ND
80B	fluorene	ND
81B	phenanthrene	ND
82B	dibenzo(a,h)anthracene	ND
83B	indeno(1,2,3-cd)pyrene	ND
84B	pyrene	ND

II. HEAD COMPLETION

ORT NO: 17-12,15-74,27-63

18097

SAMPLE NUMBER
CA1195-E405

B. TENTATIVELY IDENTIFIED COMPOUNDS.

CAS #	COMPOUND NAME	FRACTION	% MAXIMUM SCORE ATTAINED MASS MATCHING ROUTINES Purity (SPECIFY)	
1	Benzoicacid, 4-Chloro-	Acid	87%	
2	1-Propanol, 2,3-Dichloro	B/N	58%	**
3	Benzenemethanol, Alpha, Alpha-Dimethyl	B/N	82%	
4	Benzene, 1,4, Diisoethyl	B/N	49%	
5	Furan, 2-Butyl Tetrahydro	B/N	51%	
6	Ethane, 1,2-Bis(2Chloroethoxy	B/N	30%	*
7	1(3-H) Isobenzofuranone 5-Methyl	B/N	52%	
8	Ethane 1,1-Oxybis(2Ethoxy	B/N	50%	
9	1-Propene	VOA	92%	
10	2-Propanone	VOA	97%	
11	Propane, 2-Chloro	VOA	84%	
12	Propane, 1-Chloro	VOA	92%	
13	1-Propene, 3-Chloro-2-Methyl-	VOA	73%	
14	Butanamide	VOA	18%	*
15	2-Pentanone, 4-Methyl	VOA	72%	
16	2-Pentanone, 4-Methyl	VOA	33%	
17	Cyclotrisiloxane, Hexamethyl	VOA	76%	
18	Benzene, 1,2-Dimethyl	VOA	52%	
19	Benzene, Ethyl	VOA	61%	
20	Ethanol, 2-(2-Chloroethoxy)	VOA	45%	

** Poor Spectral match (major peaks are missing.)

YF, CRC

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SECTION 1

INTRODUCTION

1.1 OBJECTIVES OF FIELD PROGRAM

The objectives of the field program to be undertaken as part of the RI/FS at the Skinner Landfill site in West Chester, Ohio, are as follows:

- o To determine the volume, characteristics and concentrations of hazardous materials in the buried lagoon.
- o To evaluate the potential extent of buried drums in the area just north of the buried lagoon and the extent to which these drums are a source of hazardous contaminants.
- o To determine if materials buried in the currently active landfill are releasing hazardous contaminants to surface water and/or groundwater.
- o To assess the extent of actual groundwater contamination from the lagoon, landfill,and other potential buried sources in the eastern part of the site.
- o To screen for groundwater contamination from localized potential sources scattered across the site.
- o To characterize the potential for migration of hazardous contaminants by groundwater including:
    - assessing the depth and configuration of the bedrock surface
    - characterizing the stratigraphy of the site subsoils and near-surface rock formations
    - characterizing the hydrogeologic properties of the saturated subsoils and rock materials
    - determining the depth and configuration of the water table
    - evaluating groundwater flow directions and velocities, both horiontally and vertically.

- To assess the extent of surface water and sediment contamination, if any, in the two streams and six ponds on and adjacent to the site.

- To characterize the potential for migration of hazardous contaminants by surface water including:

  - characterizing the relationship of groundwater and surface water bodies on-site

  - characterizing the amount and variation of stream discharge in the two streams on-site

  - characterizing the amount and variation of suspended sediment transport in the two streams on-site.

- To identify potential receptors of contamination migrating through groundwater pathways.

- To identify potential receptors of contamination migrating through surface water pathways.

- To evaluate the quality of water utilized by private wells within one-half mile of the site with respect to Priority Pollutants and Primary Drinking Water Standards.

- To evaluate the impacts of hazardous contaminants, if any, on aquatic receptors in the surface water bodies on and adjacent to the site.

1.2 SCOPE OF FIELD ACTIVITIES

The field program implemented to achieve the objectives listed above includes the following sampling activities:

- Drilling five borings in the area of buried lagoon and collecting samples of waste material and underlying soils.

- Excavating six test pits in the area just north of the buried lagoon and collecting samples of waste material and underlying soils.

- Sampling of surface soil (and shallow subsoil) in localized areas adjacent to drums, tanks or surficial residues.

- o Installing 30 groundwater monitoring wells and collecting samples of subsoil and near-surface rock material.
- o Collecting groundwater samples from the 30 monitoring wells installed on-site.
- o Collecting groundwater samples from private wells both on and off site.
- o Sampling surface water and sediment at 13 locations in the two streams and six ponds on and adjacent to the site, and sampling of dilute leachate seepage at three locations.

In addition to these sampling activities, the field program implemented to achieve the objectives listed above in Subsection 1.1 includes the following measurement and survey activities:

- o Establishment of grid co-ordinate system for locating sampling locations and other points of interest.
- o Geophysical surveys in the area of the buried lagoon and at selected locations throughout the site.
- o Installation of 13 staff gages in the streams and ponds on and adjacent to the site.
- o A leveling survey to determine the elevations of monitoring wells, staff gages and other points of interest.
- o Periodic measurement of water levels in monitoring wells and at staff gages.
- o Surveys to evaluate sources of potable drinking water and public utilization of groundwater within one mile of the site.
- o A qualitative ecological survey of the streams and ponds on and adjacent to the site based on field observations.

This plan addresses the rationale and procedures for the sampling activities to be performed at the Skinner Landfill site. The plan also describes the methods to be used to document these activities and ensure the integrity of the data obtained from them (i.e. sample numbering, sample containers and preservation, sample packaging and shipment, field records, and chain-of-custody). Except as needed to describe the sampling activities, details of other measurement or survey activities are not included in this plan. These activities are fully described in the work plan.

1.3 SCOPE OF SAMPLING ACTIVITIES

The scope of sampling activities encompassed by this plan includes the installation of 30 monitoring wells, the drilling of five sampled soil borings, the excavation of six sampled test pits, and the collection and analysis of 331 samples. Chemical analysis to detect priority pollutants and other hazardous materials will be performed on 265 samples, of which 217 are investigative, 24 are duplicates and 24 are blanks. Geotechnical index properties (grain-size distribution, Atterberg Limits) will be determined for 66 samples, including six field duplicates, to characterize on-site soil materials. The environmental media to be sampled include waste, surface water, sediment, soil, and groundwater. The sampling effort is summarized in Table 1-1, and the sampling and analysis program is summarized in detail in Table 1-2.

TABLE 1-1

SUMMARY OF SAMPLING EFFORT

Type	Investigative	Duplicate	Blank	Total
HIGH HAZARD				
Waste-Boring (WB)	15	2	2	19
Waste-Test Pit (WP)	18	2	2	22
Drum-Residue (DR)	20	2	2	24
Total	53	6	6	65
MEDIUM HAZARD				
Soil-Boring (SB)	10	1	1	12
Soil-Test Pit (SP)	12	1	1	14
Soil-Surface (SS)	20	2	2	24
Total	42	4	4	50
LOW HAZARD				
Groundwater (GW)	66	7	7	80
Private Well (PW)	10	1	1	12
Surface Water (SW)	30	4	4	38
Sediment (SD)	16	2	2	20
Subtotal-Water	106	12	12	130
Total	122	14	14	150
CHEMICAL ANALYSIS	217	24	24	265
GEOTECHNICAL				
Soil-Well (SL)	60	6	0	66
TOTAL	277	30	24	331

TABLE 1-2

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Samples			QA Samples						Matrix Total
						Duplicate			Blank			
			No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	
Soil-Boring (Medium)	Qualitative organic vapor screening with OVA and/or HNu	RAS organics package from CLP including 30 tentatively identified parameters	10	1	10	1	1	1	1	1	1	12
		RAS inorganics/metals package from CLP	10	1	10	1	1	1	1	1	1	12
		RAS inorganics/cyanide package from CLP	10	1	10	1	1	1	1	1	1	12
		SAS for additional pesticides	10	1	10	1	1	1	1	1	1	12
Waste-Boring (High)	Qualitative organic vapor screening with OVA and/or HNu	RAS high hazard sample preparation by HSL for following SASs	15	1	15	2	1	2	2	1	2	19
		RAS organics package from CLP including 30 tentatively identified parameters	15	1	15	2	1	2	2	1	2	19
		RAS inorganics/metals package from CLP	15	1	15	2	1	2	2	1	2	19
		RAS inorganics/cyanide package from CLP	15	1	15	2	1	2	2	1	2	19
		SAS for additional pesticides	15	1	15	2	1	2	2	1	2	19
Soil-Test Pit (Medium)	Qualitative organic vapor screening with OVA and/or HNu	RAS organics package from CLP including 30 tentatively identified parameters	12	1	12	1	1	1	1	1	1	14
		RAS inorganics/metals package from CLP	12	1	12	1	1	1	1	1	1	14
		RAS inorganics/cyanide package from CLP	12	1	12	1	1	1	1	1	1	14
		SAS for additional pesticides	12	1	12	1	1	1	1	1	1	14

Notes: Field parameters determined for investigative and duplicate samples only.

Samples shown as blanks for solid media are matrix spikes.

TABLE 1-2 (cont.)

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Samples No.	Investigative Samples Freq.	Investigative Samples Total	QA Samples Duplicate No.	QA Samples Duplicate Freq.	QA Samples Duplicate Total	QA Samples Blank No.	QA Samples Blank Freq.	QA Samples Blank Total	Matrix Total
Waste-Test Pit (high)	Qualitative organic vapor screening with OVA and/or HNu	RAS high hazard sample preparation by HSL for following SAS:	18	1	18	2	1	2	2	1	2	22
		RAS organics package from CLP including 30 tentatively identified parameters	18	1	18	2	1	2	2	1	2	22
		RAS inorganics/metals package from CLP	18	1	18	2	1	2	2	1	2	22
		RAS inorganics/cyanide package from CLP	18	1	18	2	1	2	2	1	2	22
		SAS for additional pesticides	18	1	18	2	1	2	2	1	2	22
Soil-Surface (Medium)	Qualitative organic vapor screening with OVA and/or HNu	RAS organics package from CLP including 30 tentatively identified parameters	20	1	20	2	1	2	2	1	2	24
		RAS inorganics/metals package from CLP	20	1	20	2	1	2	2	1	2	24
		RAS inorganics/cyanide package from CLP	20	1	20	2	1	2	2	1	2	24
Soil-Wells	Qualitative organic vapor screening with OVA and/or HNu	Atterberg Limits (ASTM D 4318-83)	20	1	20	2	1	2	0	0	0	22
		Particle size analysis (ASTM D 422-63) sieve analysis	20	1	20	2	1	2	0	0	0	22
		Particle size analysis (ASTM D 422-63)	20	1	20	2	1	2	0	0	0	22

Notes: Field parameters determined for investigative and duplicate samples only.

Samples shown as blanks for solid media are matrix spikes.

ASTM methods can be found in American Society of Testing and Materials 1984 Annual Book of Standards, Volume 4.08, Soil and Rock; Building Stones, pgs. 750-765 and pgs. 116-126 respctively. Laboratory testing to be performed by a qualified geotechnical laboratory.

TABLE 1-2 (cont.)

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

			Investigative Samples			QA Samples						
						Duplicate			Blank			Matrix
Sample Matrix	Field Parameters	Laboratory Parameters	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	Total
Groundwater (Low)	pH Specific conductance Temperature	RAS organics package from CLP including 30 tentatively identified parameters	30	2	60	3	2	6	3	2	6	72
		RAS inorganics/metals package from CLP filtered samples	30	2	60	3	2	6	3	2	6	72
		RAS inorganics/metals package & SAS for suspended solids - unfiltered samples	6	1	6	1	1	1	1	1	1	8
		RAS inorganics/cyanide package from CLP filtered samples	30	2	60	3	2	6	3	2	6	72
Private Wells (Low)	pH Specific conductance Temperature	HSL Acid extractables and base/neutral extractables from CRL	10	1	10	1	1	1	1	1	1	12
		HSL Pesticides and PCBs from CRL	10	1	10	1	1	1	1	1	1	12
		Additional pesticides	10	1	10	1	1	1	1	1	1	12
		HSL Volatile organics from CRL	10	1	10	1	1	1	1	1	1	12
		HSL Metals and major cations (Ca, Mg, Na, K) from CRL—unfiltered samples	10	1	10	1	1	1	1	1	1	12
		Cyanide from CRL — unfiltered samples	10	1	10	1	1	1	1	1	1	12
		Minerals from CRL (alkalinity, chloride, sulfate)	10	1	10	1	1	1	1	1	1	12
		Nutrients from CRL (ammonia, nitrate-nitrite)	10	1	10	1	1	1	1	1	1	12

Notes: Field parameters determined for investigative and duplicate samples only.

Samples shown as blanks for solid media are matrix spikes.

TABLE 1-2 (cont.)

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

			Investigative Samples			QA Samples						
						Duplicate			Blank			Matrix
Sample Matrix	Field Parameters	Laboratory Parameters	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	Total
Surface Water (Low)	pH	RAS organics package from CLP including 30 tentatively identified parameters	16	1	16	2	1	2	2	1	2	20
	Specific conductance											
	Temperature	RAS inorganics/metals package from CLP unfiltered samples	16	1	16	2	1	2	2	1	2	20
		RAS inorganics/cyanide package from CLP unfiltered samples	16	1	16	2	1	2	2	1	2	20
		SAS for total supended solids	7	2	14	1	2	2	1	2	2	18
Sediment (Low)	Qualitative organic vapor screening with OVA and/or HNu	RAS organics package from CLP including 30 tentatively identified parameters	16	1	16	2	1	2	2	1	2	20
		RAS inorganics/metals package from CLP	16	1	16	2	1	2	2	1	2	20
		RAS inorganics/cyanide package from CLP	16	1	16	2	1	2	2	1	2	20
Off-Site Soil (Low)	Qualitative organic vapor screening with OVA and/or HNu	RAS organics package from CLP including 30 tentatively identified parameters	3	1	3	0	0	0	0	0	0	3
		RAS inorganics/metals package from CLP	3	1	3	0	0	0	0	0	0	3
Drum-Residue (High)	Qualitative organic vapor screening with OVA and/or HNu	RAS high hazard sample preparation by HSL for following SAS:	20	1	20	2	1	2	2	1	2	24
		RAS organics package from CLP including 30 tentatively identified parameters	20	1	20	2	1	2	2	1	2	24
		RAS inorganics/metals package from CLP	20	1	20	2	1	2	2	1	2	24
		RAS inorganics/cyanide package from CLP	20	1	20	2	1	2	2	1	2	24

Notes: Field parameters determined for investigative and duplicate samples only.

Samples shown as blanks for solid media are matrix spikes.

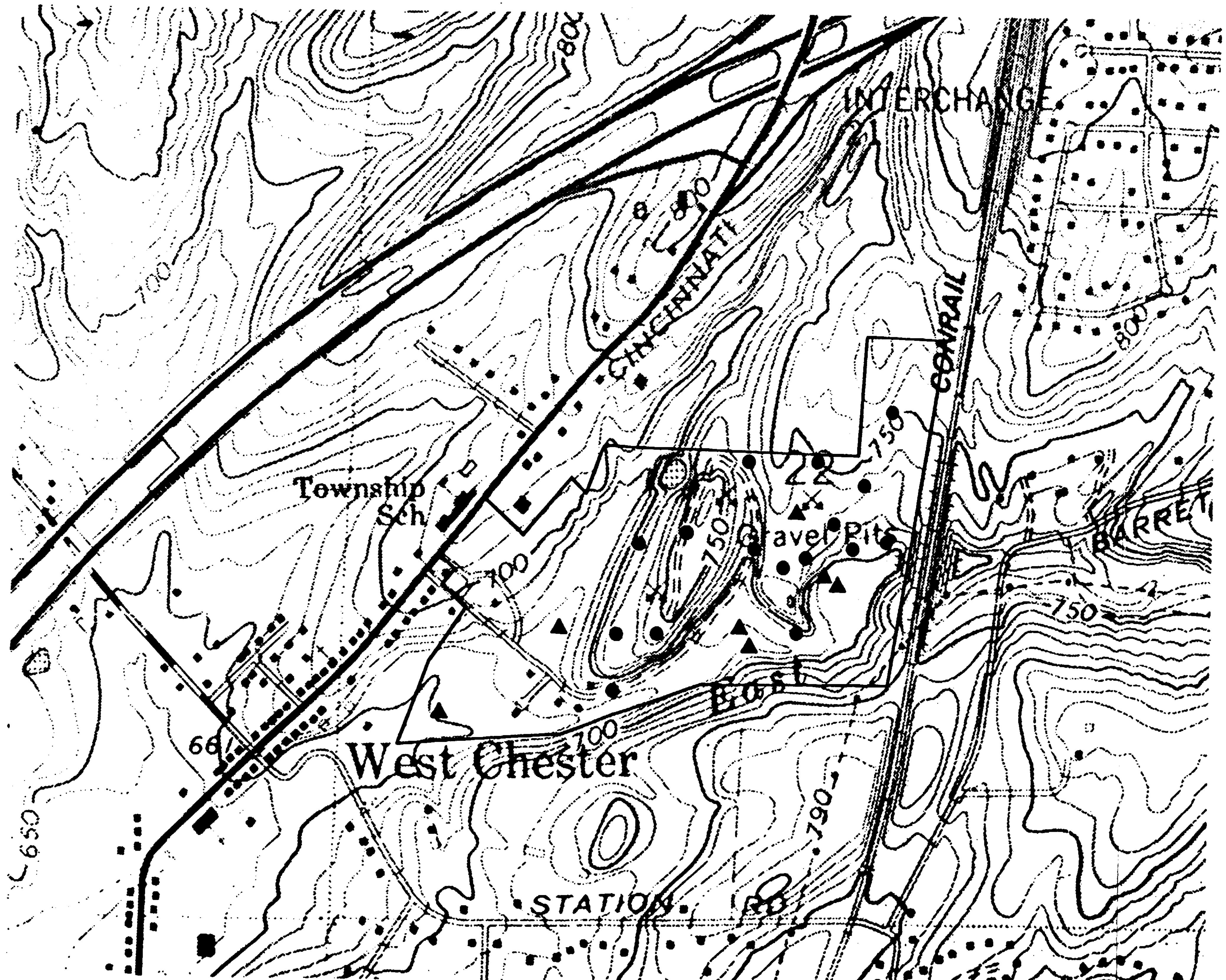
SECTION 2

SAMPLE LOCATIONS AND RATIONALE

The 78-acre Skinner Landfill site has substantial local relief and contains a variety of natural and man-made features. To facilitate location descriptions within the site, the site area has been divided into 22 "investigation areas" on the basis of similar/contrasting features observable in aerial photographs taken February 7, 1976. These investigation areas are listed in Table 2-1 and their locations are shown in Figure 2-1.

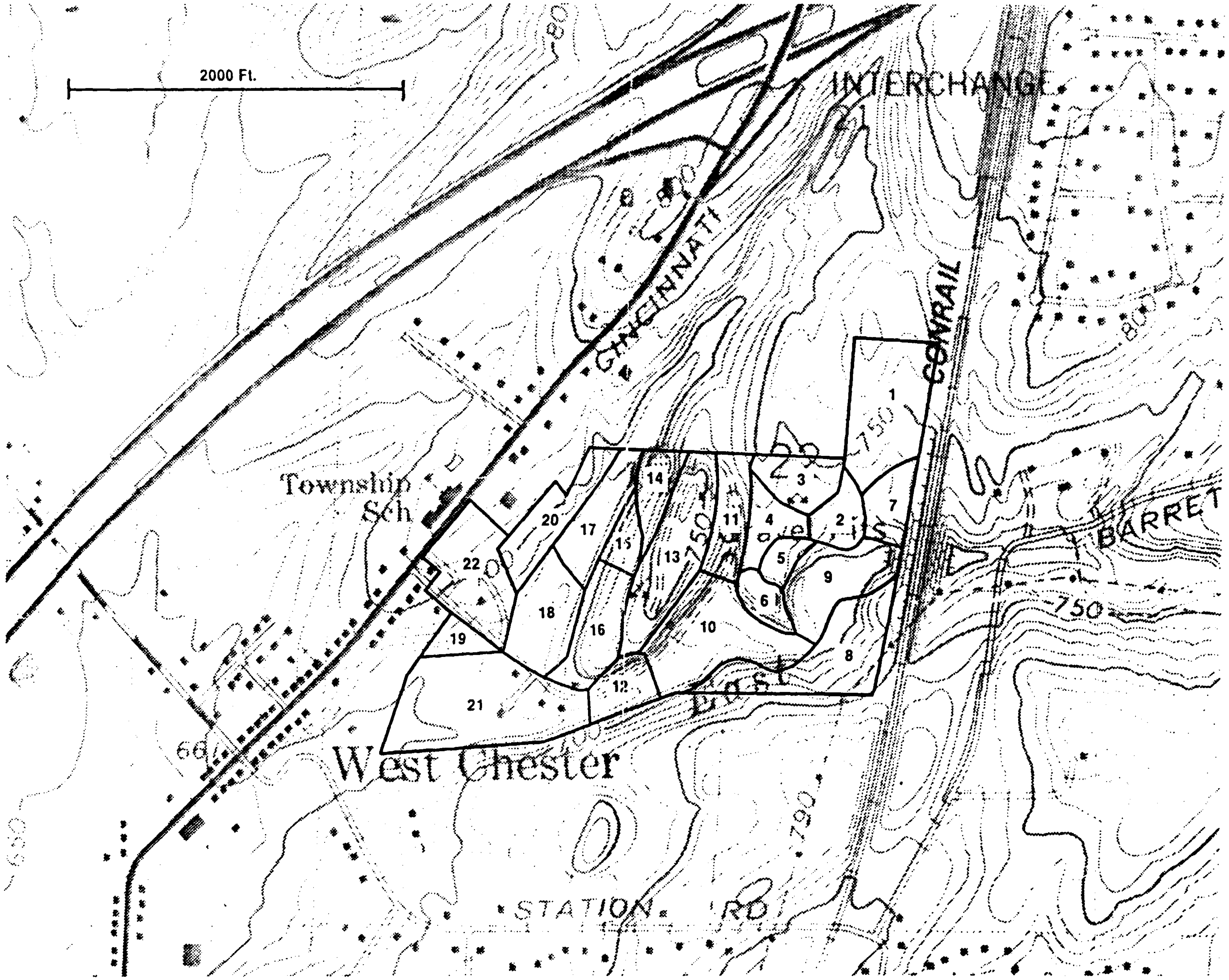
Based on data existing as of September 1984 and data collected during two site visits since then (October 9, 1984 and February 28 -- March 1, 1985), the following statements can be made summarizing current knowledge of the sources, migration pathways, potential receptors, and extent of contamination:

- There are known and potential buried sources of hazardous contaminants in the Lagoon, Central Shoulder, and Landfill areas.
- There are scattered, localized potential sources, consisting of drums (containing liquids and solids), tanks (also containing liquids and solids) and surficial residues, in six other areas -- the North Shoulder, Upper and Middle East Fork Valleys, the Hilltop, the South Bench, and Middle Skinner Creek Valley. Some of these sources appear to date from the late 1970's, whereas others appear to be more recent and/or part of on-going activities at the site.
- The migration pathways of primary concern are groundwater and surface water. Contaminated surficial soils may be of concern in areas where spillage has occurred from drums or tanks.
- Potential receptors of contaminants migrating via groundwater include surface water bodies and groundwater users. Potential receptors of contaminants migrating via surface water include aquatic organisms and surface water users.
- Groundwater southeast of the buried lagoon is known to be contaminated with more than 12 organic compounds with concentrations totaling at least 1.6 ppm (FIT Well B-6, installed and sampled during July 1982). As of 1977, contaminants had apparently not migratged off site via surface water or to private wells via groundwater.



Legend
● Water Table Well
▲ Water Table Well and Deeper Piezometer Nested

FIGURE 1 MONITORING WELL LOCATIONS



Note: See Table 3 for designations of investigation areas.

FIGURE. 2-1 INVESTIGATION AREAS - SKINNER LANDFILL

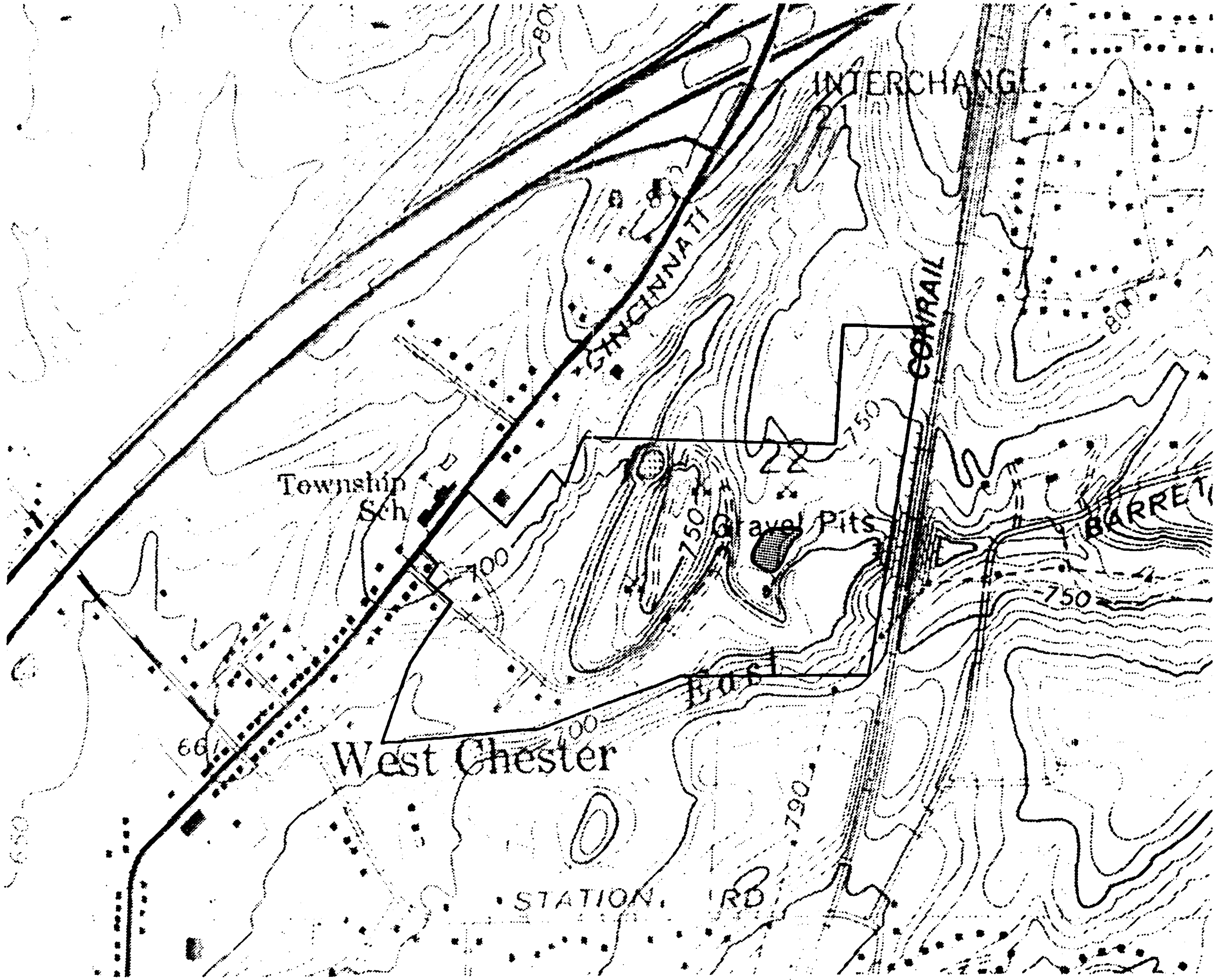


FIGURE 2-2 WASTE AND SOIL SAMPLES - LAGOON AREA

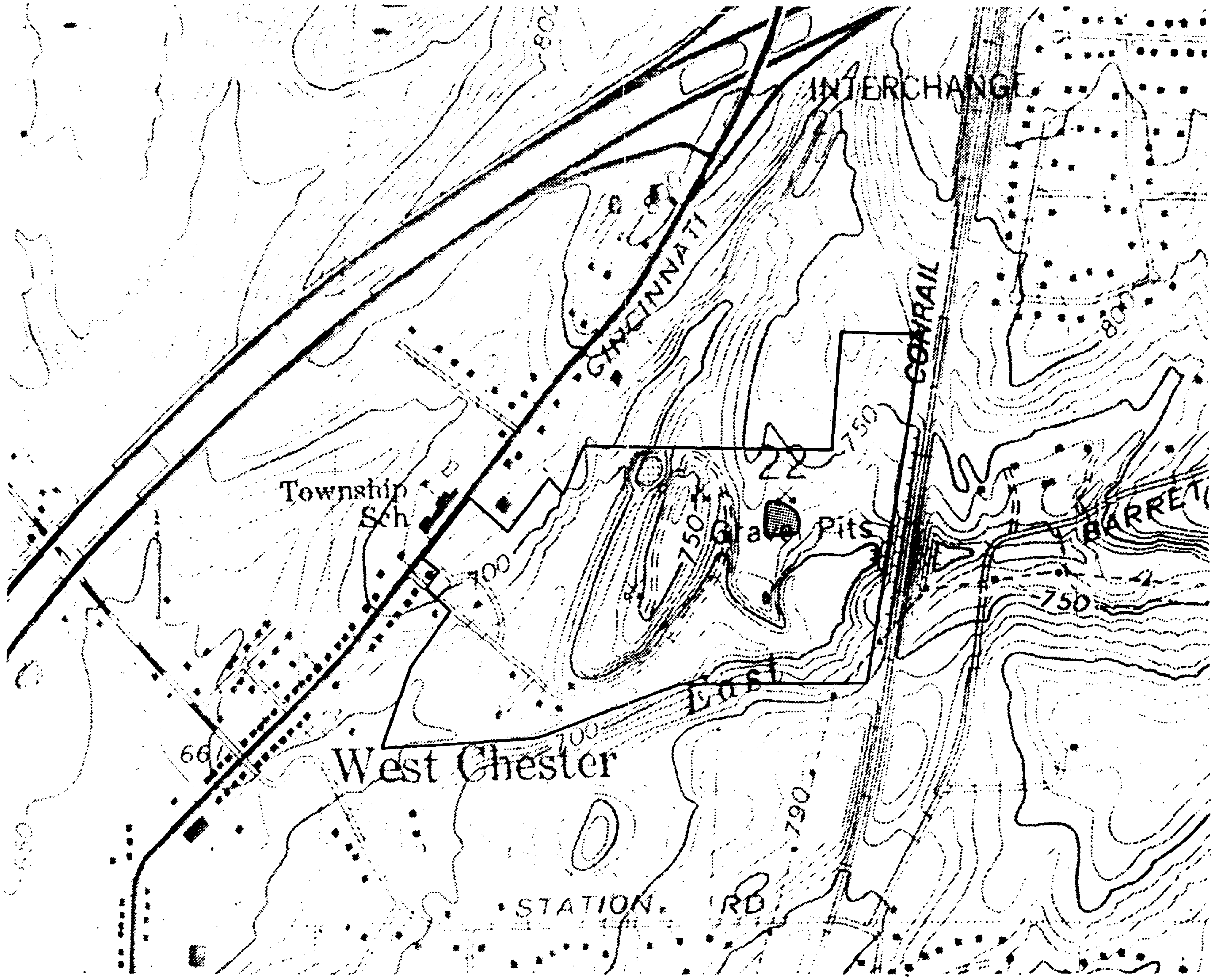


FIGURE 2-3 WASTE AND SOIL SAMPLES - CENTRAL SHOULDER AREA

The following subsections describe where and why samples are being collected at the Skinner Landfill site.

2.1 WASTE AND SOIL SAMPLES - LAGOON AREA

There is clear evidence that liquid wastes were disposed of in the former lagoon, and that the lagoon was buried shortly after Ohio EPA began its investigation of the site. Analysis of samples collected from a test excavation into the buried lagoon by Ohio EPA indicated that the wastes included pesticides, pesticide intermediates, volatile organics, and various metals. However, the actual concentrations and volume of the waste in the lagoon are not well defined. Five test borings will be used to obtain specific information on the internal layering of the buried lagoon and to collect samples of waste and underlying natural soil for chemical characterization. The borings will be drilled to an average depth of forty feet, each boring penetrating at least five feet into natural soils. Three waste samples and two soil samples collected from each boring will be sent for laboratory analysis. Geophysical surveys with ground-penetrating radar (GPR), and/or magnetometer will provide supplemental data on the physical dimensions and internal features of the buried lagoon. The lagoon investigative area is outlined in Figure 2-2. Actual boring locations will be determined in the field.

2.2 WASTE AND SOIL SAMPLES - CENTRAL SHOULDER AREA

Because of the large number of drums present in the Central Shoulder area in the 1976 aerial photographs and the available information concerning regrading at the site, there is reason to believe that a considerable number of drums are buried just north of the former lagoon. If drums are buried in the Central Shoulder area, their residual contents may represent a source of hazardous contaminants. To determine if buried drums are present and, if so, to assess the character of potential sources within the buried waste material, six test pits will be excavated. Profiles of wastes and soil will be measured, and three waste samples and two samples of the underlying natural soil will be collected from each test pit. If surficial wastes containing metal can be moved out of the area, geophysical surveys could provide supplemental data on the areal extent of any drum burial found during test pitting. The portion of the Central Shoulder investigative area that will be examined is outlined in Figure 2-3. Actual test pit locations will be determined in the field.

2.3 SOIL RESIDUE SAMPLES

During the 1985 site visit, it was noted that in many instances, the soils adjacent to drums, tanks and waste residues were stained or showed other evidence of waste infiltration. To characterize the nature and extent of residual soil contamination caused by these situations, surficial soil samples will be collected at 10 locations

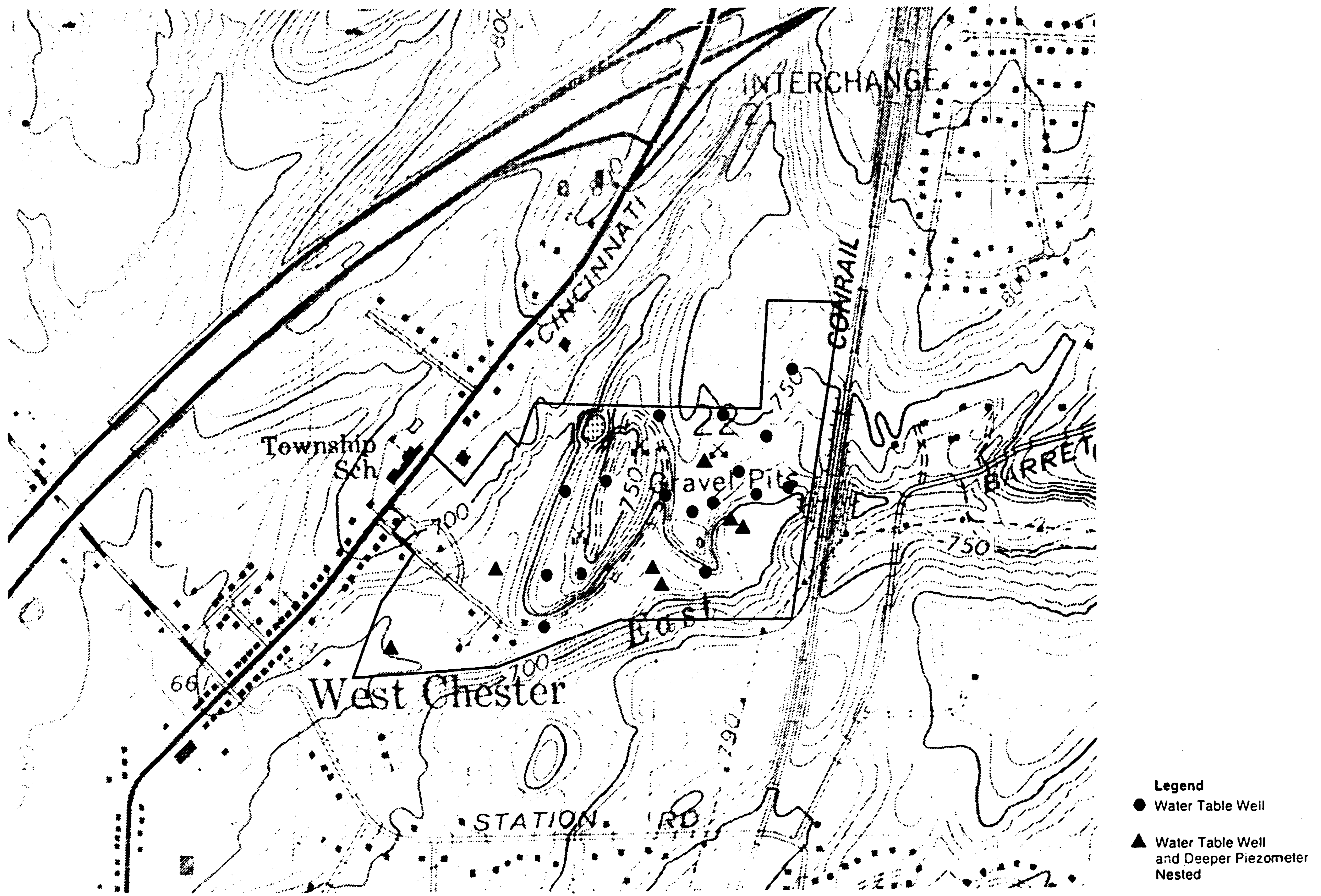


FIGURE 2-4 MONITORING WELL LOCATIONS

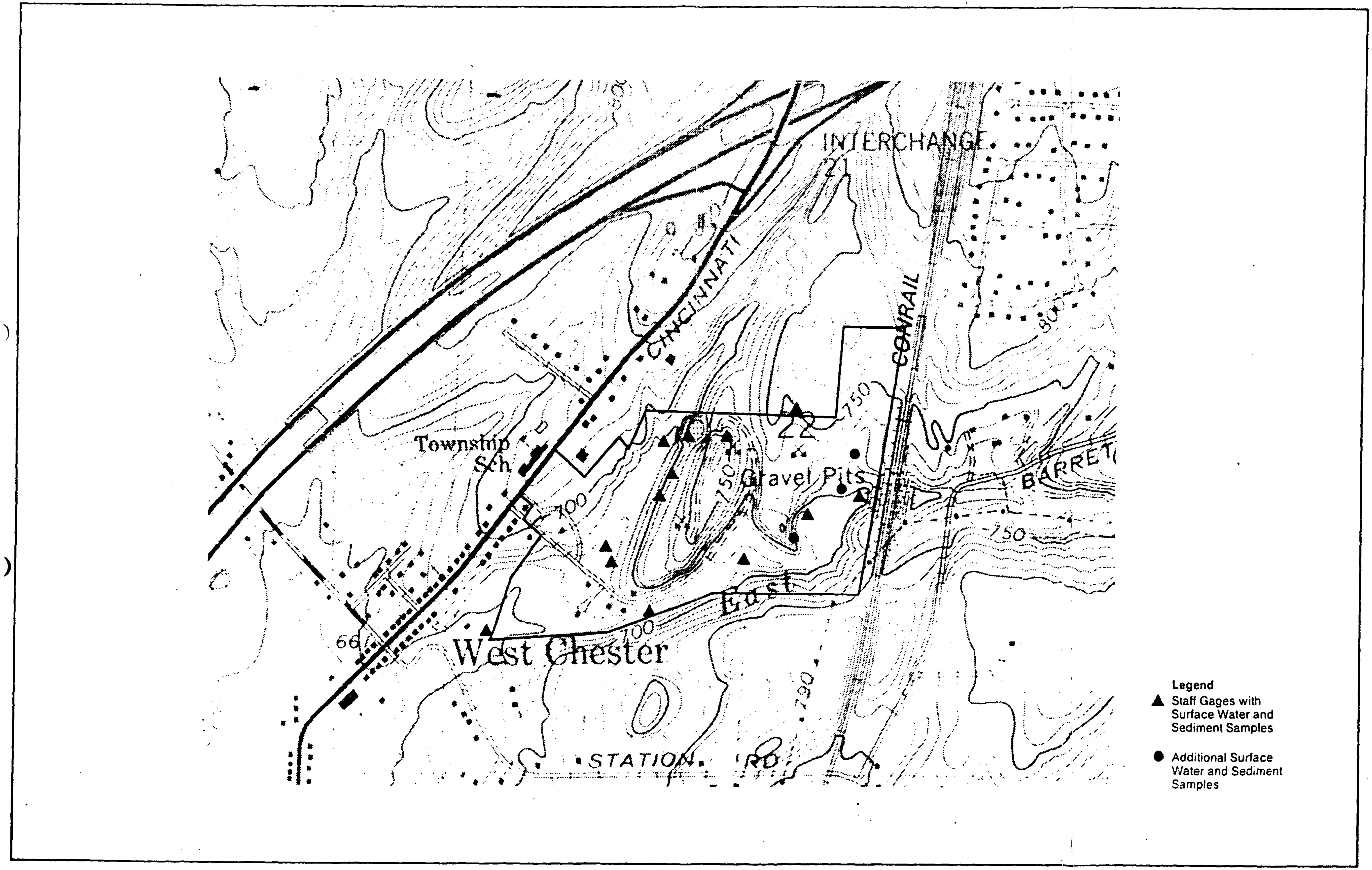


FIGURE 2-5 SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

at the site. By obtaining samples from two depth intervals -- 0 to 6 inches and 12 to 18 inches, it will be possible to characterize the vertical distribution of waste constituents and assess relative mobilities. The actual locations of this sampling will be determined in the field on the basis of conditions existing at the time of the field investigation.

2.4 MONITORING WELL INSTALLATION AND GROUNDWATER SAMPLES

According to two preliminary assessments of the hydrogeology at the Skinner Landfill site (Hosler, 1976; St. John, 1981) regional groundwater flow in the vicinity of the site is probably southwesterly toward a narrow buried valley underlying West Chester. However, local on-site flow patterns, which are probably influenced by topography, on-site surface water bodies, and subsurface conditions, are not well defined. Knowledge of on-site stratigraphy is limited, indicating only that there is glacial drift of varying thickness and character overlying interbedded shales and dolomites. It is anticipated that the bedrock surface is an important hydrogeologic feature.

Although there is evidence that groundwater southeast of the buried lagoon is contaminated with a variety of organic chemicals, the presence and extent of contamination in other parts of the site is not known. Of particular interest in this respect are the potential source areas in the Central Shoulder and Landfill investigation areas. (Due to the nature of the demolition debris in the landfill, test borings, test pits and geophysical surveys are not expected to be applicable to characterization of that area as a potential source of hazardous contaminants. Thus indirect characterization through groundwater and surface water sampling is being used).

To address the related data needs for characterizing the groundwater migration pathway and the nature and extent of groundwater contamination, a total of 30 monitoring wells will be installed at the site. Single, water table wells will be installed at 16 locations, and nested pairs, consisting of a water table well and an adjacent (deeper) piezometer, will be installed at seven locations. In the eastern half of the site, one borehole drilled at each well location will be extended to bedrock and rock will be cored to confirm its presence (as apposed to a boulder) and character. Some wells and piezometers may be installed in bedrock. In the western half of the site, where greater drift thickness is anticipated, boreholes for piezometers will extend to bedrock but all single well boreholes will have a depth of 50 feet or 10 feet below the water table whichever is greater. Geophysical surveys will provide supplemental data on the depth to and configuration of the bedrock surface. Data collected during installation of the monitoring wells will allow characterization of the subsurface soil and near-surface rock stratigraphy, the hydrogeologic properties of these earth materials, the direction and velocity -- both horizontal and vertical -- of groundwater flow, and the relationship of groundwater to surface water.

Two rounds of groundwater samples will be collected from all 30 wells. Filtered aliquots for metals analysis will be obtained at all wells. An additional six unfiltered aliquots for metals analysis and determination of total suspended solids will be collected during the first sampling round. The approximate locations of the monitoring wells are shown in Figure 2-4.

2.5 PRIVATE WELL SAMPLES

Surveys will be performed to identify sources of potable drinking water and groundwater utilization within one mile of the site. Using data collected during these surveys and information concerning local groundwater flow patterns obtain from the newly installed monitoring wells, 10 private wells within one-half mile of the site will be selected for sampling and chemical analysis. To the extent possible, these wells will be representative of upgradient and downgradient positions and have an even geographic distribution.

2.6 SURFACE WATER AND SEDIMENT SAMPLES

Surface water draining from the site may contain hazardous contaminants. In addition, contaminated groundwater could be discharging to on-site surface water bodies. Contaminants could also be accumulating on or migrating with related sediments. Samples of surface water and sediment will be collected and analyzed to assess these possibilities. Sampling locations include five sites along East Fork, two sites along Skinner Creek, six ponds or impoundments on the site, and three locations of dilute leachate seepage. In addition, seven unfiltered samples will be collected from the streams on two separate occasions for characterization of their suspended sediment load. The approximate location of the surface water and sediment sampling are shown in Figure 2-5.

2.7 WASTE SAMPLES

Evidence from the 1976 aerial photographs and the site visit of February-March 1985 indicates that there are numerous drums scattered throughout the Skinner property. Any drums remaining on site which are open will be sampled during the remedial investigation. It is expected that the remaining drums will be crushed or rusted and will contain only small amounts of residue. No drums will be opened for sampling. The residues remaining in the drums are of unknown composition; to characterize these localized potential sources of contamination the drums will be sampled using a combination of composite and grab sampling techniques. Compositing will be done on the basis of similar waste appearance and investigation area.

2.8 DOCUMENTING SAMPLING LOCATIONS

The physical locations of all monitoring wells, borings and on-site (or immediately adjacent off site) sampling sites will be documented photographically and determined by taping and leveling surveys. Taping surveys will use newly installed grid marks as reference points. The leveling survey will be tied to mean sea level datum, which may require an off-site traverse to establish an on-site benchmark. Surface water, sediment and soil area sampling locations will be established and surveyed in advance of sample collection. Soil boring, soil trench and monitoring well sites will be surveyed during or after the work is performed. Stakes will be used at sampling locations lacking other physical reference points. Horizontal accuracy will be to within 1.0 foot and vertical accuracy will be to within 0.01 foot.

SECTION 3

SAMPLE NUMBERING SYSTEM

All samples for chemical analysis, including duplicates and blanks, will be given a unique sample number. A listing of Weston and CRL sample numbers, cross-referenced to chain-of-custody and shipment documents, will be maintained in the sample handling logbook. The sample numbers will consist of three parts:

- Project identifier--a two-letter designation used to identify the site; for Skinner Landfill these letters will be SL
- Sample type and location--a two-letter designation of the sample type followed by a two digit number for the sampling location. A list of the two-letter codes for sample types is presented in Table 3-1, which also lists the location numbers for each sample type. Sampling locations are shown in Figures 2-2 through 2-5.

Some examples of the sampling number system are as follows:

- SL-WB04-01: Skinner Landfill, waste-boring sample, location 04, first sample.
- SL-GW40-DP: Skinner Landfill, groundwater sample, location 40, duplicate.
- SL-PW55-BK: Skinner Landfill, private well sample, location 55, blank (taken prior to collecting investigative sample at this location).

Duplicates and blanks must be taken at different locations if there is more than one sampling round.

TABLE 3-1

SAMPLE TYPE CODES AND LOCATION NUMBERS

Type	Code
Waste and Soil -- Boring	WB, SB
Waste and Soil -- Test Pit	WP, SP
Surface Soil	SS
Groundwater	GW
Private Wells	RW
Surface Water and Sediment	SW, SD
Drums-Residue (DR)	DR

Note: Soil samples collected during installation of the monitoring wells will have a two-letter code of SL and the appropriate two-digit location number.

SECTION 4

SAMPLING PROCEDURES AND EQUIPMENT

4.1 WASTE AND SOIL SAMPLES - LAGOON AREA

Test borings will be performed at five locations in the area of the buried lagoon to characterize the nature and volume of wastes present. Each boring will be sampled continuously from the ground surface to an average depth of 40 feet with each boring penetrating at least five feet into natural soil materials. Samples will be collected using a 3-inch diameter split-spoon device that will be driven into the ground in consecutive 18-inch intervals. The over-sized split-spoon is needed to provide enough sample for standard CLP analyses, especially when duplicates are collected.

The boring will be advanced using hollow stem augers or other methods approved by the geologist that do not use drilling fluids. Because drums are known to be buried in the area, the borings will be advanced with extreme care. The levels of volatile organics, hydrogen cyanide, and explosive gases in the borehole will be measured after every sample is collected.

Upon recovery from the borehole, the sampler will be placed on a clean Teflon sheet and opened. As the spoon is opened, the sample material will be qualitatively screened with OVA and/or HNu instruments and described by a qualified geologist or geotechnical engineer. The instrument readings and sample description will be entered in the sampling logbook. The sample material will then be divided into three six-inch samples and placed in separate sample containers using stainless steel spatulas. If less than 18-inches of sample is recovered by the split-spoon, the geologist or geotechnical engineer will use his judgement to assign depth intervals to the recovered material.

Five six-inch samples will be sent to the laboratory for each boring location. Three of these samples will be waste materials and two will be underlying natural soil. Samples selected for testing will be identified in the field on the basis of visual criteria and qualitative organic vapor screening so that a representative chemical profile of the boring is obtained. The split spoons, Teflon sheet and spatulas, will be decontaminated in accordance with the standard protocol presented in Table 4-1 prior to each use. The drilling rig and all related equipment and tools used at one boring will be steam-cleaned prior to re-use.

TABLE 4-1

STANDARD DECONTAMINATION PROTOCOL FOR SAMPLING EQUIPMENT

STEP 1 -- Scrub equipment throughly with soft-bristle brushes in a low-sudsing detergent solution (e.g., Alconox).

STEP 2 -- Rinse equipment with tap water by submerging and/or spraying.

STEP 3 -- Rinse equipment with acetone and/or hexane by spraying until dripping; retain drippings.

STEP 4 -- Rinse equipment with distilled water by spraying until dripping.

STEP 5 -- Rinse equipment with ultra-pure water by spraying until dripping.

STEP 6 -- Place equipment on plastic or aluminum foil and allow to air-dry for five to ten minutes.

STEP 7 -- Wrap equipment in plastic or aluminum foil for handling and/or storage until next use.

Notes: In addition to the standard protocol, pumps and discharge lines will be decontaminated by pumping the detergent solution, tap-water rinse and distilled water rinse through the equipment.

4.2 WASTE AND SOIL SAMPLES - CENTRAL SHOULDER AREA

Six test pits will be excavated in the Central Shoulder area to determine if drums are buried in the area and, if so, to characterize the nature of potential sources within the buried material. The depth of the pits is estimated to be 15 to 20 feet. If possible, the pit will be excavated through the waste and just into the underlying natural soils.

Excavation of the test pits will be done with a backhoe and will proceed by layers. That is, the pit will be deepened until different materials are encountered; then the pit will be enlarged areally by careful scraping of the remaining material in that layer. This will allow "clean" surficial materials to be segreated from "dirty" wastes and drums and stockpiled. It will also allow the test pit to be backfilled to essentially original conditions.

Because this area may contain buried drums, extreme care will be taken during excavation of the test pits. In addition to using an experienced backhoe operator, ambient and in-trench air conditions will be monitored for organic vapors, hydrogen sulfide, hydrogen cyanide and explosive gases during excavation. Evidence of previous excavations (disturbed soil structures) or waste burial (discolored soil, non-soil solids, etc.) will be noted, and the entire side wall areas of the pits will be photographed.

Where evidence of waste burial is found, up to three waste samples will be collected in each pit. A 4-inch diameter bucket auger, angled into the sidewall from the opposite side of the pit, will be used to obtain the samples. The material retrieved by the auger will be emptied onto a sheet of Teflon for closer examination and then placed in sample containers using stainless steel spatulas. When natural soils are encountered, the 4-inch bucket auger will be used to obtain two samples of this material from depths of at least one foot and two feet below the bottom of the waste. All sampling equipment will be decontaminated in accordance with the standard protocol presented in Table 4-1 prior to each use.

4.3 SURFACE SOIL SAMPLES

Characterization of residual soil contamination resulting from spills at drum or tank locations and from other surficial waste residues will be addressed through the collection of discrete soil samples at ten locations. At each location, a 4-inch diameter bucket auger will be used to collect separate soil samples from the depth intervals of 0 to 6 inches and 12 to 18 inches. Sample material will be emptied from the auger onto a Teflon sheet, where it will be examined by the sampling team and qualitatively screened for organic vapors with an OVA and/or HNu. The sample material will then be transferred to sample bottles using stainless steel spatulas. Spatulas will be decontaminated in accordance with the standard protocol listed in Table 4-1 prior to each use. Actual sampling locations will be determined in the field on the basis of then existing conditions.

4.4 MONITORING WELL INSTALLATIONS

A total of 30 monitoring wells will be installed at 23 separate locations. Seven locations will have two-well nests consisting of one water table well at an estimated depth of about 20 feet and one piezometer screened in the lower portion in the saturated overburden or in bedrock at a depth of approximately 20 feet below the water table well. Sixteen locations will have single wells screened at the water table, at an estimated depth of about 20 feet each.

4.4.1 Two-well Nests

Monitoring well installation will begin at locations having two-well nests. The deep piezometer will be installed first so that the shallower stratigraphy is mostly defined prior to installation of the water table well. The following procedures will be used to install the deep piezometer:

- The working end of the drilling rig and all equipment, tools and materials will be steam cleaned prior to drilling at each location. Provisions will be made to keep the equipment, tools and materials from coming into contact with surficial soils during drilling and well installation.

- The borehole will be advanced through overburden soils using hollow stem augers (6-inch ID), cable-tool methods (4-inch casing) or other technique approved by the geologist that does not use drilling fluids.

- Soil samples will be collected using standard split-spoon and Shelby tube samplers. Samples will be collected continuously (every 18 inches) to a depth of 15 feet, and at 2.5 foot intervals thereafter to the bottom of the boring. As each sample is recovered, it will be qualitatively screened for organic vapors using OVA and/or HNu instruments. The boring will be logged by a geologist or geotechnical engineer and the samples retained for future reference and possible geotechnical index testing.

- Soil drilling and sampling will proceed until the borehole has encountered both auger/casing and split spoon refusal. If hollow stem augers are being used, casing will be telescoped through the augers and seated into the bottom of the borehole. Two five-foot rock coring runs will then be attempted. The core will be logged by the geologist and retained in a wooden core box for future reference.

- Upon completion of drilling, the borehole will be flushed with clean water to remove all suspended solids from the inside of the casing. The borehole will be backfilled with a mixture of compressed bentonite pellets and sand to the depth selected for the bottom of the screen.

- At locations where there is little or no suspected contamination, the well will be constructed out of 2-inch diameter, Schedule 40 PVC with flush-threaded couplings and a five-foot screened interval at the bottom. In areas supected of having moderate to high levels of organic contamination (ten areas), low carbon steel will be substituted for the PVC riser and stainless steel will be substituted for the PVC screen. The screen will be factory mill-slotted or continously slotted with openings of 0.010 inches. No glues or solvents will be used.

- The annular space around the screen will be backfilled with a silt-free flint sand to a height at least two feet above the top of the screen. A two-foot seal of compressed bentonite pellets will be placed above the sand pack, and the remaining annular space will be filled with a cement-bentonite grout placed with a tremie pipe.

- A four-inch diameter, locking protective casing will be installed at the surface with a concrete anchor and runoff diversion apron. The riser will be covered with a loosely fitting, vented cap. Locks will be provided. Three vehicle-bumper posts will be installed around the well if it is in a traffic area.

- The well will be developed by surging and pumping until five well volumes have been removed and clear water is obtained during pumping. Upon completion of development, a bail-down recovery test will be performed to provide data for calculating the hydraulic conductivity of the screened interval.

The shallow wells at these locations (two-well nests) will be installed using procedures similar to those described above except that:

- Samples will be obtained at 5-foot intervals for the entire depth of the boring.

- The depth of the boring will be at an average of 20 feet or at least 10 feet below the water table whichever is greater.

- The screened interval will be ten feet in depth.

- Extra care will be taken to ensure that the annular space of the well is completely sealed against surface runoff.

The details of well construction for two-well nests are shown in Figure 4-1.

4.4.2 Single-Well Installations

Monitoring wells at locations having one well will be installed last using the following procedures:

- The working end of the drilling rig and all equipment, tools and materials will be steam cleaned prior to drilling at each location. Provisions will be made to keep the equipment, tools and materials from coming into contact with surficial soils during drilling and well installation.

- The borehole will be advanced using hollow stem auger (6-inch ID), cable-tool drilling methods (4-inch casing) or other drilling technique approved by the geologist that does not use drilling fluids.

- Soil samples will be collected using standard split-spoon and Shelby tube samplers. Samples will be collected at 2.5-foot intervals to the bottom of the boring. As each sample is recovered, it will be qualitatively screened for organic vapors using OVA and/or HNu instruments. The boring will be logged by a geologist or geotechnical engineer and the samples retained for future reference and possible geotechnical index testing.

- In the eastern half of the site, drilling and sampling will proceed until the both auger/casing and split spoon refusal are encountered. If hollow stem augers are being used, casing will be telescoped through the augers and seated into the bottom of the hole. One five foot rock coring run will then be attempted. The core will be logged by the geologist and retained in a wooden core box for future reference.

- In the western part of the site, drilling and sampling will proceed until the borehole has advanced to a depth of 50 feet or 10 feet below the water table, whichever is greater. If rock is encountered at shallower depths, at least five feet, but not more than 10 feet of rock will be cored.

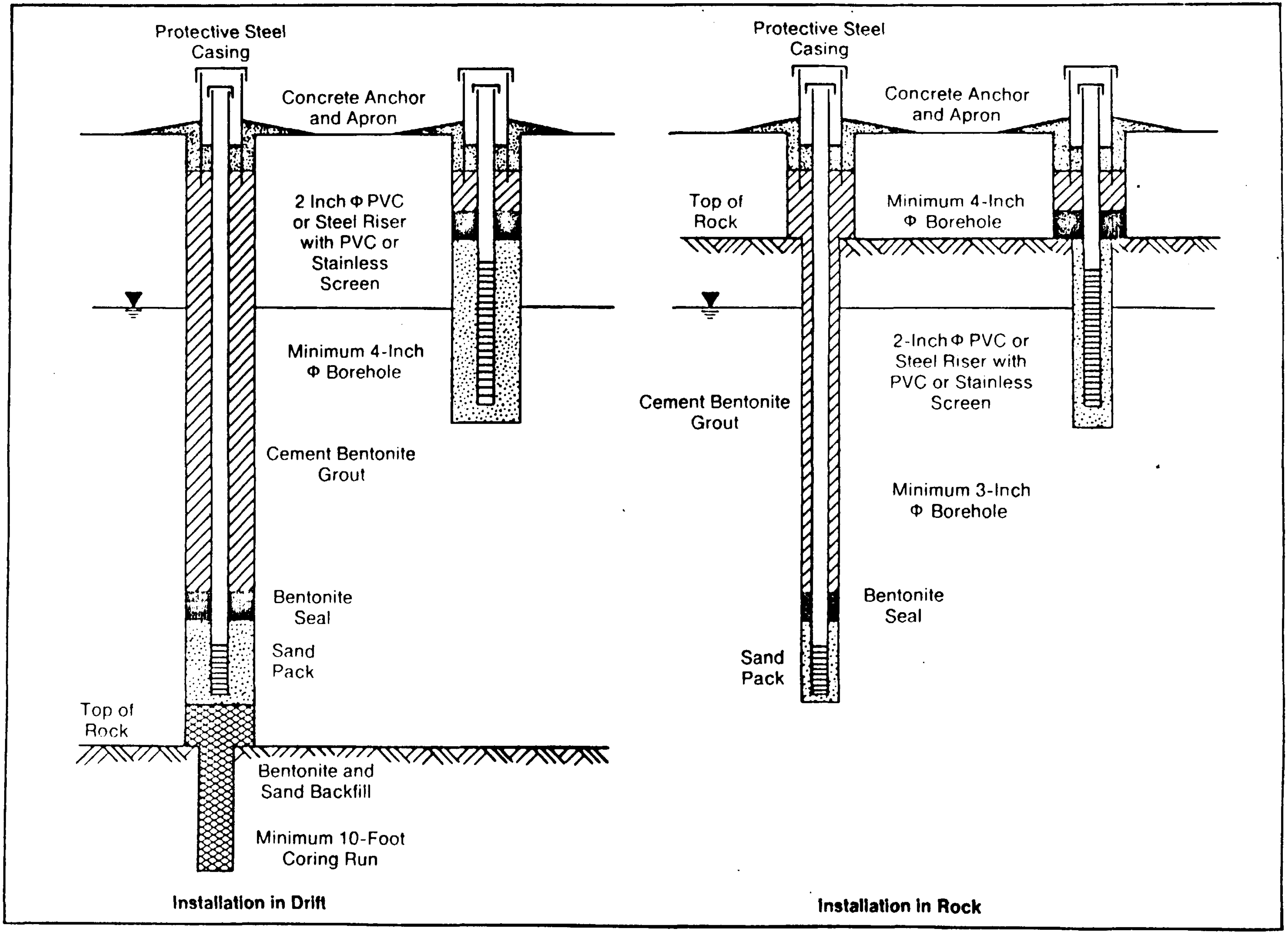


FIGURE 4-1 CONSTRUCTION DETAILS - TWO WELL NESTS

- Upon completion of drilling, the borehole will be flushed with clean water to remove all suspended solids from the inside of the casing. The borehole will be backfilled with a mixture of sand and bentonite pellets to the depth selected for the bottom of the screen.

- At locations where there is little or no suspected contamination, the well will be constructed out of 2-inch diameter, Schedule 40 PVC with flush-threaded couplings and a ten-foot screened interval at the bottom. In areas suspected of having moderate to high levels of organic contamination (ten areas), low carbon steel will be substituted for the PVC riser and stainless steel will be substituted for the PVC screen. The screen will be factory mill-slotted or continuously slotted with openings of 0.010 inches. No glues or solvents will be used.

- The annular space around the screen will be backfilled with a silt-free flint sand to a height at least two feet above the top of the screen. A two-foot seal of compressed bentonite pellets will be placed above the sand pack, and the remaining annular space will be filled with a cement-bentonite grout placed with a tremie pipe.

- A four-inch diameter, locking protective casing will be installed at the surface with a concrete anchor and runoff diversion apron. The riser will be covered with a loosely fitting, vented cap. Locks will be provided. Three vehicle bumper posts will be installed around the well if it is in a traffic area.

- The well will be developed by surging and pumping until five well volumes have been removed and clear water is obtained during pumping. Upon completion of development, a bail down recovery test will be performed to provide data for calculating the hydraulic conductivity of the screened interval.

The details of well construction for the single-well installation are shown in Figure 4-2.

4.5 GROUNDWATER SAMPLES

Groundwater samples will be collected from all 30 monitoring wells installed for this investigation. Samples will be collected using the following procedures:

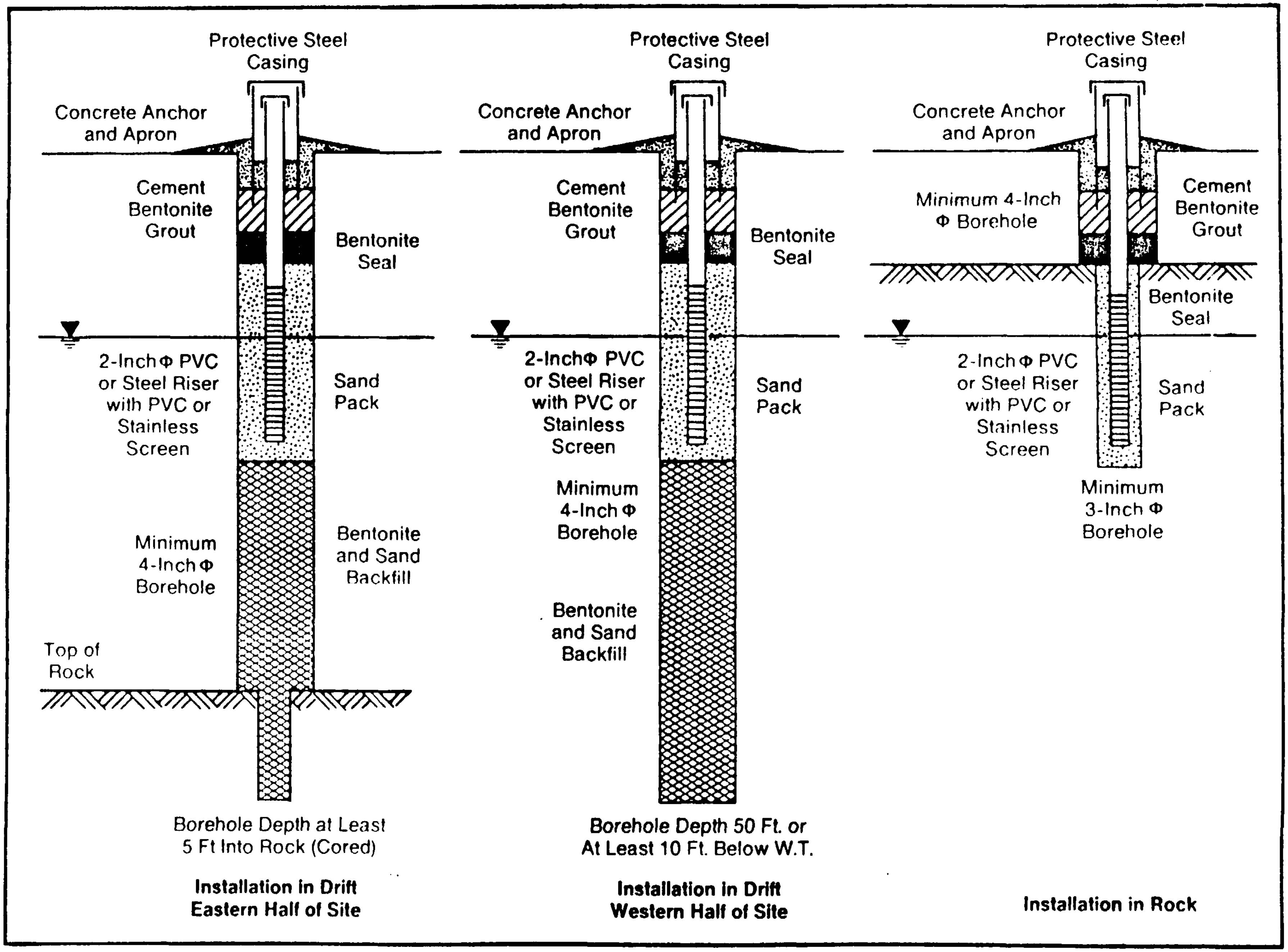


FIGURE 4-2 CONSTRUCTION DETAILS - SINGLE WELL INSTALLATION

- The depth to the water level in the well will be measured with an electrical sounder or a weighted steel or fiberglass tape. The weight will be designed to create a popping sound on contact with the water surface.

- Based on the water level measurement and the depth of the well, the volume of standing water in the well will be calculated.

- The well will be purged using a pump or bailer constructed of chemically inert materials. The standard procedure will be to pump until at least three well volumes have been removed.

- Beginning with the fourth volume, periodic measurements of pH, specific conductance and temperature will be made using the procedures contained in Appendix A.

- Purging may cease when measurements for all three parameters have stabilized ($\pm$0.25 pH units, $\pm$ 50 umhos/cm, and $\pm$ 0.5° C) for three consecutive readings or after five well volumes have been removed.

- If the well pumps dry before three volumes have been removed, the well will be allowed to recharge for 15 minutes and then pumped dry again.

- The sample will be obtained with a stainless steel or teflon bailer. The bailer will be raised and lowered in the well using a new length of nylon cord at each location.

- The sampling and purging equipment will be decontaminated in accordance with the standard protocol presented in Table 4-1 prior to each use.

4.6 PRIVATE WELL SAMPLES

Private well water samples will be collected from 20 wells in the site vicinity. Access to all of these wells will be coordinated by the U.S. EPA, Ohio EPA and Butler County Public Health officials. Samples will be collected as close to the well head as possible with sample bottles filled directly from a tap/spigot. Pretreatment systems, such as water softeners, should be avoided; if pretreatment systems cannot be avoided, the proximity of the sampling point from the system should be recorded in the sampler's log book. The well pumps should be operating for at least 10 minutes prior to collection of the sample. Field measurements of pH, specific conductance, and temperature will be performed using the procedures outlined in Appendix A.

4.7 SURFACE WATER AND SEDIMENT SAMPLES

Surface water and sediment samples will be collected from sixteen locations on-site, including six areas of ponded water, seven locations along the two steams on site, and three locations of dilute leachate seepage. Samples will be obtained at least 10 feet from the edge of ponded water areas and just below the water surface at midstream for stream and seepage samples. Sampling procedures will consist of submerging a single-use intermediate collection bottle directly into the water body and then transfering the required aliquots to the actual sample bottles. Field measurements of pH, specific conductance, and temperature will be performed using the procedures contained in Appendix A.

Wherever surface water samples are collected sediment samples will also be collected. These sediment samples will be obtained with a hand auger or soil probe. The top six inches of soil material will be collected at each location and emptied onto a Teflon sheet. It will then be transferred into sample containers with stainless steel spatulas. The sampling equipment, including the spatulas and Teflon sheet, will be decontaminated in accordance with the standard decontamination protocol presented in Table 4-1 prior to each use.

4.8 WASTE SAMPLES FROM SCATTERED DRUMS

Laboratory analysis will be performed on 20 samples of the wastes contained in the drums currently scattered around the site to characterize the nature of these potential sources. Following the on-site inventory of the drums, a waste characterization plan will be developed. This plan will identify which drums will be sampled, which sample aliquots will be grab samples, and which sample aliquots will be combined as composite samples. Only drums that are open or with lids askew will be sampled. Solid residues will be sampled; liquid matrix will not be sampled. The plan will be developed in the field on the basis of visual and monitoring instrument data collected during the waste inventory.

Waste samples of solids in drums will be collected with stainless steel spatulas, triers, trowels and/or shovels as appropriate to the consistency and accessibility of the waste being sampled. All reusable sampling equipment will be decontaminated prior to each use in accordance with the standard protocols listed in Table 4-1. Before combining sample aliquots to form composite samples, small amounts of each material will be mixed together under controlled conditions to check for incompatibility. These procedures are described in Appendix B.

4.9 QUALITATIVE ORGANIC VAPOR SCREENING OF SOIL SAMPLES

The purpose of this activity is to obtain a preliminary indication of the magnitude and distribution of volatile contaminants in the subsurface. Screening data may also be used to adjust the depths of monitoring wells, particularly in the upper two hydrostratigraphic units. The procedures are as follows:

- o Verify that the OVA and/or HNu have been calibrated within the past 4 hours and that the equipment is functioning properly. (For calibration and operating information refer to "Instruction & Service Manual, MI 2R900AC, Century Systems, Portable Organic Vapor Analyzer, Model OVA-128" and "Instruction Manual for Model PI 101, Photoionization Analyzer, HNu Systems, 1975.)

- o As the split-spoon is opened, pass the air intakes along the sample at a distance of about one-half inch, noting the location and magnitude of any readings.

- o At roughly six-inch intervals, position the intakes close to the sample and then disturb the soil material with a spatula, noting any readings.

- o If methane is believed to be interfering with OVA readings, attempt a second reading using a carbon filter. If hydrogen sulfide is believed to be interfering with HNu readings, attempt to verify its presence with an indicator tube.

- o Record the highest reading on each instrument for each six-inch interval of sample recovered, identifying interferences and basis of measurement.

- o Before the borehole is advanced or the next sample is taken, place the air intakes in the borehole, six inches below the top of casing, noting any readings and interferences as above.

4.10 BAILDOWN TESTING OF WELLS

The basic concept behind these tests is that the rate of rise of the water level in a well after an "instantaneous" withdrawal of a "slug" of water is a function of aquifer hydraulic conductivity. Thus by measuring water levels at various times following withdrawal of the slug, the hydraulic conductivity can be calculated. The basic requirements are being able to quickly withdraw a fairly large slug of water and being able to readily and accurately measure water levels in the well. Analysis of test data should use appropriate computational methods such as that presented by Bouwer, H. and R.C. Rice, 1977, "A

Aquifers with Completely or Partially Penetrating Wells", Water Resources Research, vol. 12, no. 3, pp. 423-428.

Baildown testing of monitoring wells installed at Skinner Landfill will be performed as follows:

- o Prior to initiation of the baildown test, an initial measurement of static water level will be made.
- o A slug of water will then be withdrawn as rapidly as possible using bailers and/or submersible pumps depending on anticipated conditions. Highly permeable conditions ($K \geq 10^{-3}$ cm/sec) are not anticipated.
- o Using a weighted tape or electrical sounding device, water level measurements will be made at intervals sufficient to establish the permeability of the soil or rock formations.
- o The data will be plotted in the field (water level vs. log time) using semi-log paper to determine if the data are sufficient to establish a reasonable straight-line relationship.
- o If the data are not sufficient, an additional log cycle of data will be obtained, or the well will be allowed to recover completely and then be retested.

4.11 STORAGE AND DISPOSAL OF DRILLING AND SAMPLING WASTES

The sampling and drilling activities are expected to generate solid and liquid "wastes". The activities, the anticipated type and amount of waste, and the planned handling of the wastes are summarized below.

- o Waste boring sampling: solid, auger cuttings and excess soil/cuttings collected but not retained in jars -- returned to borehole upon completion (bentonite plug placed in borehole near surface); liquid -- none.
- o Waste pit sampling: solid, approximately one half cubic yard of spoil per foot of pit -- returned to excavation upon completion; liquid -- none.
- o Surface soil sampling: solid, any excess soil from that collected for the composite -- returned to holes created by sample collection; liquid -- none.
- o Monitoring well installation: solid, approximately 1 cubic foot of cuttings per 10 lineal feet of borehole (total of about 83 cubic feet) -- left at borehole locations; liquids, up to 0.8 gallons per lineal foot of well volume of water

removed during well development (total not more than 664 gallons), and up to 0.5 gallons per lineal foot of well volume of water removed for baildown testing (total not more than 415 gallons) -- retained in drums and bulked with other liquid wastes for future disposal.

- o Groundwater sampling: solid -- none; liquid, up to 0.8 gallons per lineal foot of well volume of water purged from wells prior to sampling (total not more than 664 gallons) -- retain in drums and bulk with other liquid wastes for future disposal.

- o Private well sampling: no wastes anticipated.

- o Surface water sampling: no wastes anticipated.

- o Sediment sampling: solid, any excess sediment collected in auger but not retained in jars -- left at sampling site; liquid — none.

- o Drum residue sampling: no wastes anticipated.

Disposal of bulked "liquid wastes" will depend on analytical test results of samples taken to characterize the wastes. Sampling will be done in lots of 5 drums each with a composite sample taken from each lot. Testing will be for RCRA (Part 261) hazard criteria and any parameters needed to determine acceptability at a POTW. If the material in a lot is determined to be hazardous that lot will be disposed of at a licensed hazardous waste facility. If the material in a lot is determined not to be hazardous, arrangements will be made to dispose of it through local sanitary sewer/wastewater treatment plant facilities. Very little hazardous "liquid waste" is anticipated.

SECTION 5

SAMPLE ANALYSIS AND HANDLING

5.1 TESTING PROGRAM

The testing program for the samples collected during implementation of this plan is summarized in Table 1-2. All water sampled (i.e., surface water, private wells, and groundwater) will be tested in the field for pH, specific conductance, and temperature. The water, sediment, waste, and soil samples collected for chemical analysis will be tested for the Routine Analytical Services (RAS) organics package, which uses a GC screening followed by GC/MS analysis for quantification of 133 compounds on the Hazardous Substances List and the RAS inorganics package, which includes 23 metals and cyanide. Based on existing analytical data and site conditions, samples from the site will include low, medium and high concentration samples.

The private well samples will be sent to the Central Regional Laboratory (CRL). High hazard samples will be sent to a Hazardous Substances Laboratory. All other samples for chemical analysis will be sent to assigned Contractor Laboratory Program (CLP) facilities. Special Analytical Services (SAS) will be requested for standard RAS organic and inorganic parameters in extracts from high hazard samples. SAS will also be requested for additional pesticides in some media and for determination of total suspended solids in unfiltered groundwater samples. Sixty-six of the soil samples collected during installation of the monitoring wells will be tested to characterize basic geotechnical index properties. Twenty two samples will be tested for Atterberg Limits, twenty two samples will be tested using hydrometer analysis, and twenty two samples will be tested using sieve analysis.

5.2 SAMPLE CONTAINERS AND PRESERVATION

5.2.1 High Hazard Samples

Samples collected for chemical analysis through the CLP that are high hazard, that is those collected from drums, tanks, or spills where they have not been diluted by environmental conditions, will be contained in accordance with U.S. EPA protocols listed in Table 5-1. These samples are shipped directly to one of the RAS program's Hazardous Substance Laboratories (HSL) for preparation. The analysis to be performed at the time the high hazard sample preparation is scheduled must be specified to ensure that testing is completed in the same manner as the analytical procedures at the CLP or regional laboratory. All high hazard samples are placed into 8-ounce wide-mouth glass jars, sealed into paint cans, and marked as hazardous. No preservatives are required for high hazard samples.

TABLE 5-1

REQUIRED SAMPLE CONTAINERS AND PRESERVATION
FOR SAMPLES TESTED BY A HAZARDOUS SUBSTANCE LABORATORY

Organics in Water and Liquids (High Concentration)

Testing	Containers	Preservation
All Organics Analysis	One 8-ounce wide-mouth glass jar with Teflon-lined cap; filled to 3/4 full	None Required

Inorganics in Water and Liquids (High Concentration)

Testing	Containers	Preservation
All Inorganics Analysis	One 8-ounce wide-mouth glass jar; filled to 3/4 full	None Required

Organics in Soil and Sediment (High Concentration)

Testing	Containers	Preservation
All Organics Analysis	One 8-ounce, wide-mouth, glass jar with Teflon-lined lid; filled about 3/4 full	None Required

Inorganics in Soil and Sediment (High Concentration)

Testing	Containers	Preservation
All Inorganics Analysis	One 8-ounce, wide-mouth glass jar; filled about 3/4 full	None Required (optional)

Note: All high hazard sample bottles must be shipped in paint cans as hazardous to one of the RAS program's Hazardous Substance Laboratory.

5.2.2 Medium Hazard Samples

Medium hazard samples collected through the CLP will be contained, preserved and shipped as appropriate for the intended testing and in accordance with U.S. EPA protocols listed in Table 5-2. Medium hazard samples are those that have originated from drums or residues, but that have been diluted somewhat by environmental conditions. All medium hazard sample containers will be placed in paint cans and marked as hazardous. The amount of sample required is listed in Table 5-2. In all other respects, medium hazard samples are treated in the same manner as low hazard samples.

5.2.3 Low Hazard Samples

Samples collected for chemical analysis through the CLP will be contained and preserved as appropriate for the intended testing and in accordance with U.S. EPA protocols listed in Table 5-2. Samples collected for chemical analysis by the CRL will be contained and preserved in accordance with the protocols listed in Table 5-3. If necessary, samples will be placed on ice immediately after collection to maintain a temperature of 4°C.

Some surface water samples and all groundwater samples collected for RAS inorganics metals analysis will be filtered in the field as soon as possible after collection and prior to the addition of nitric acid preservative. Filtering will be done with a pressure filtration device and 0.45 micron filter paper. The surface water samples (from all 16 locations), all water supply samples, and six groundwater samples collected for metals analysis will not be filtered prior to acid preservation. Refer to Table 1-2 for details of which samples will be filtered.

5.3 SAMPLE PACKAGING AND SHIPMENT

5.3.1 High Hazard Samples

In preparation for shipment to the analytical laboratories, all samples will be packaged in accordance with the following procedures:

- o Tighten cap securely and seal with tape; mark liquid levels if bottles are partially full.
- o Make sure traffic report labels and custody tags are securely attached to the sample container; place each container in a zip-loc baggie, ensuring that labels can be read.
- o Place all containers into paint cans and fill cans with vermiculite.

TABLE 5-2

REQUIRED SAMPLE CONTAINERS AND PRESERVATION
FOR SAMPLES TESTED BY CLP

Organics in Water and Liquids (Medium Concentration)

Testing	Containers	Preservation
Extractables (acid, base/neutral, pesticides/PCB)	Four 32-ounce wide mouth glass jars with Teflon-lined caps; filled to neck	None Required
Volatiles	Two 40-ml VOA vials with Teflon-lined caps; completely filled--no air bubbles	None Required

Inorganics in Water and Liquids (Medium Concentration)

Testing	Containers	Preservation
Metals	One 16-ounce wide mouth glass amber bottle; filled to shoulder	1:1 HNO_3 to $pH < 2$
Cyanide	One 16-ounce wide mouth glass amber bottle; filled to shoulder	6N NaOH to $pH < 12$
Total suspended solids	One 500-ml high density polyethylene bottle; filled to shoulder	None Required

TABLE 5-2 (Continued)

REQUIRED SAMPLE CONTAINERS AND PRESERVATION
FOR SAMPLES TESTED BY CLP

Organics in Soil and Sediment (Medium Concentration)

Testing	Containers	Preservation
Extractables (acid, base/neutral, pesticides/PCB)	One 8-ounce, wide-mouth, glass jar with Teflon-lined lid; filled about 3/4 full	None Required
Volatiles	Two 120-ml glass vials with Teflon-lined lid; filled as completely as possible.	None Required

Inorganics in Soil and Sediment (Medium Concentration)

Testing	Containers	Preservation
Metals and Cyanide	One 8-ounce, wide-mouth glass jar; filled about 3/4 full	None Required

Note: All medium hazard sample bottles must be shipped in paint cans marked as hazardous.

Note: Water samples collected for duplicate analysis of organics must be collected at double the volume specified for extractables and at triple the volume specified for volatiles. In addition, one volatile trip blank (distilled-deionized water poured directly into two 40-ml vials) should be supplied per shipment.

Note: If sample preservation is required, pH will be monitored to assure proper adjustment.

TABLE 5-2 (Continued)

REQUIRED SAMPLE CONTAINERS AND PRESERVATION
FOR SAMPLES TESTED BY CLP

Organics in Water and Liquids (Low Concentration)

Testing	Containers	Preservation
Extractables (acid, base/neutral, pesticides/PCB)	Two 1/2-gallon glass amber bottles with Teflon-lined caps; filled to neck	Iced to 4°C
Volatiles	Two 40-ml VOA vials with Teflon-lined caps; completely filled—no air bubbles	Iced to 4°C

Inorganics in Water and Liquids (Low Concentration)

Testing	Containers	Preservation
Metals	One 1-liter high density polyethylene bottle; filled to shoulder	5 ml 8N HNO_3 to pH < 2
Cyanide	One 1-liter high density polyethylene bottle; filled to shoulder	6N NaOH to pH < 12
Total suspended solids	One 500-ml high density polyethylene bottle; filled to shoulder	None Required

TABLE 5-2 (Continued)

REQUIRED SAMPLE CONTAINERS AND PRESERVATION
FOR SAMPLES TESTED BY CLP

Organics in Soil and Sediment (Low Concentration)

Testing	Containers	Preservation
Extractables (acid, base/neutral, pesticides/PCB)	One 8-ounce, wide-mouth, glass jar with Teflon-lined lid; filled about 3/4 full	Iced to 4°C
Volatiles	One 8-ounce glass vial with Teflon-lined lid; filled as completely as possible.	Iced to 4°C

Inorganics in Soil and Sediment (Low Concentration)

Testing	Containers	Preservation
Metals and Cyanide	One 8-ounce, wide-mouth glass jar; filled about 3/4 full	Iced to 4°C (optional)

Note: Water samples collected for duplicate analysis of organics must be collected at double the volume specified for extractables and at triple the volume specified for volatiles. In addition, one volatile trip blank (distilled-deionized water poured directly into two 40-ml vials) should be supplied per shipment.

Note: If sample preservation is required, pH will be monitored to assure proper adjustment.

TABLE 5-3

REQUIRED SAMPLE CONTAINERS AND PRESERVATION
FOR SAMPLES TESTED BY CRL

Organics in Water Supply Samples (Low Concentration)

Testing	Containers	Preservation
Acid extractables, base neutral extractables	Two 1/2-gallon glass amber bottles (Teflon-lined caps): filled to neck.	cool, 4°C
Pesticides/PCB's	Two 1/2-gallon glass amber bottles (Teflon-lined caps): filled to neck.	cool, 4°C
Volatiles	Two 40-ml volatile organic analysis (VOA) vials: filled completely with no air bubbles.	cool, 4°C

Inorganics in Water Supply Samples (Low Concentration)

Testing	Containers	Preservation
Metals	One 1-liter high density polyethylene bottle filled to shoulder.	5 ml 8N HNO_3 to pH < 2, iced to 4°C optional
Cyanide	One 1-liter polyethylene bottle, filled to shoulder.	5 ml 6N NaOH to pH >12, cool, 4°C
Minerals	One 500-ml polyethylene bottle, filled to shoulder.	
Alkalinity		cool, 4°C
Chloride		room temperature
Sulfate		room temperature

TABLE 5-3 (continued)

REQUIRED SAMPLE CONTAINERS AND PRESERVATION
FOR SAMPLES TESTED BY CRL

Inorganics in Water Supply Samples (Low Concentration)-continued

Testing	Containers	Preservation
Nutrients Ammonia NO_3-NO_2	One 1-liter polyethylene bottle: filled to shoulder	1 ml conc. H_2SO_4 to pH <2 cool, 4°C TKN

Note: Water samples collected for duplicate analysis of organics must be collected at double the volume specified for extractables and at triple the volume specified for volatiles. In addition, one volatile trip blank (distilled-deionized water poured directly into two 40-ml vials) should be supplied per shipment.

Note: If sample preservation is required, pH will be monitored to assure proper adjustment.

- Place containers in a cooler lined with two inches of vermiculite or equivalent absorbent material; surround each sample and fill remaining space in cooler with additional packing material.

- Put chain-of-custody forms and traffic reports in a manilla envelope; place envelope in a zip-loc baggie and tape to inside of cooler lid.

- Close cooler and seal shut with strapping tape; if cooler has a drain port, seal it shut with tape; place custody seals across closure at front of cooler.

- Mark cooler with proper labels indicating hazardous substances.

- Affix airbill with shipper's and consignee's addresses to top of cooler; if samples are liquid, place "This End Up" labels appropriately.

- Ship to a Hazardous Substances Laboratory.

High hazard samples will be shipped within 24 hours of collection via overnight carrier service for next-day delivery. The Sample Management Office will be notified of each shipment as it is made.

5.3.2 <u>Medium Hazard Samples</u>

Medium hazard samples will be shipped in the same manner as high hazard samples, but are analyzed by the CLP, rather than a Hazardous Substances laboratory.

5.3.3 <u>Low Hazard Samples</u>

In preparation for shipment to the analytical laboratories, all samples will be packaged in accordance with the following procedures:

- Check to make sure that sample is properly preserved; tighten cap securely and seal with tape; mark liquid levels if bottles are partially full.

- Make sure traffic report labels and custody tags are securely attached to the sample container; place each container in a zip-loc baggie or plastic bag, ensuring that labels can be read.

- Place containers in a cooler lined with two inches of vermiculite or equivalent absorbent material; place blue ice in cooler, surround each sample and fill remaining space in

- Put chain-of-custody forms and traffic reports in a manilla envelope; place envelope in a zip-loc baggie and tape to inside of cooler lid.

- Close cooler and seal shut with strapping tape; if cooler has a drain port, seal it shut with tape; place custody seals across closure at front of cooler.

- Affix airbill with shipper's and consignee's addresses to top of cooler; if samples are liquid, place "This End Up" labels appropriately.

Organics samples will be shipped within 24 hours of collection via overnight carrier service for next-day delivery. Inorganics samples will be shipped within 48 hours of collection for two-day delivery. The Sample Management Office will be notified of each shipment as it is made.

SECTION 6

SAMPLE DOCUMENTATION AND TRACKING

6.1 FIELD RECORDS

Field observations and other pertinent information pertaining to the collection of samples will be recorded in bound log books using black ink. Standard formats will be developed so that data relating to the collection of each type of sample and to the installation of monitoring wells are consistently recorded. These formats will be converted into rubber stamps to reduce the amount of writing required by the sampling team. The data to be recorded will include date, time, samplers, location, sample number, custody tag number, weather, instrument readings and visual description of sample, in addition to other data specific to each sample type. The standard formats are presented in Tables 6-1 to 6-9. In addition to written records, photographs will be taken as needed to further clarify sampling activities.

6.2 CHAIN-OF-CUSTODY PROCEDURES

All samples will be collected and handled in accordance with the chain-of-custody procedures summarized below:

- o All information required on the custody tag, including the signatures of all sampling team members and a predesignated location description, will be filled out in the field.
- o Prior to relinquishing samples for packaging and shipment, one member of the sampling team will transfer all data contained on the custody tags to a chain-of-custody record, which all team members will sign.
- o The individual who prepared the chain-of-custody record will relinquish the samples to the sample handling technician, who will prepare all CLP traffic reports and affix appropriate traffic report labels to the sample containers.
- o The technician will package the samples for shipment making sure that all traffic reports, chain-of-custody records and custody seals are cross-referenced and that all sample documentation paper work is enclosed.

- o If samples are stored temporarily prior to shipment, they will be kept cool and placed in a secured storage area. Coolers will be sealed and custody seals affixed just prior to shipment.

The sample handling technician will maintain lists cross-referencing site sample numbers, custody tag numbers, traffic report numbers, analyses to be performed, custody seal numbers, shippers' airbill numbers, and consigned laboratories in a bound log book using black ink. (For detailed guidance on completing chain-of-custody and sample tracking paperwork, refer to "Sampling Handbook, U.S. EPA TAT, Region V, Revised 1985.")

TABLE 6-1 (NDARD FORMAT TEST BORING SAM COLLECTION

SKINNER LANDFILL LOGGED BY: ____

TEST BORING SAMPLING ____

DATE: ____ LOCATION: ____

SAMPLERS: ____

____

____

WEATHER: ____

TIME DRILLING BEGAN: ____ HRS

TIME DRILLING ENDED: ____ HRS

LOCATION DESCRIPTION: ____

____

HAMMER WEIGHT : 140 LBS - 300 LBS

BLOW COUNTS / RECOVERY

0-1.5 FT	____ /	____
1.5-3.0 FT	____ /	____
3.0-4.5 FT	____ /	____
4.5-6.0 FT	____ /	____
6.0-7.5 FT	____ /	____
7.5-9.0 FT	____ /	____

BLOW COUNTS / RECOVERY

9.0-10.5	____ /	____
10.5-12.0	____ /	____
12.0-13.5	____ /	____
13.5-15.0	____ /	____
15.0-16.5	____ /	____
16.5-18.0	____ /	____
18.0-19.5	____ /	____
19.5-21.0	____ /	____
21.0-22.5	____ /	____
22.5-24.0	____ /	____
24.0-25.5	____ /	____
25.5-27.0	____ /	____
27.0-28.5	____ /	____
28.5-30.0	____ /	____
30.0-31.5	____ /	____
31.5-33.0	____ /	____
33.0-34.5	____ /	____
34.5-36.0	____ /	____
36.0-37.5	____ /	____
37.5-39.0	____ /	____
39.0-40.5	____ /	____

[FOR EACH BOREHOLE]

TABLE 6-1 (continued) STANDARD FORMAT TEST BORING SAMPLE COLLECTION

FIELD SAMPLE NO: ______________

DEPTH INTERVAL: ______________

TIME SAMPLE COLLECTED: __________ HRS

SAMPLE DESCRIPTION: ______________

ORGANIC VAPOR SCREENING - BOREHOLE

OVA: ________ PPM

HNu: ________ PPM SPAN POT: ________

SAMPLE	OVA (PPM)	HNu (PPM)
TOP (C)		
MIDDLE (B)		
BOTTOM (A)		

CUSTODY TAG NUMBERS (HIGH/MEDIUM)

EXTRACTABLES: ______________

VOLATILES: ______________

INORGANICS: ______________

ADD'L PESTICIDES: ______________

REMARKS: ______________

[FOR EACH SPLIT SPOON]

TABLE 6-2 STANDARD FORMAT TEST PIT SAMPLE COLLECTION

SKINNER LANDFILL
TEST PIT SAMPLING

LOGGED BY: ____________

DATE: ____________ LOCATION: ____________

SAMPLERS: ____________

WEATHER: ____________

TIME EXCAVATION BEGAN: ____________ HRS
TIME EXCAVATION ENDED: ____________ HRS

DEPTH OF TEST PIT / AIR MONITORING

0 FT / ____________
2 FT / ____________
4 FT / ____________
6 FT / ____________
8 FT / ____________
10 FT / ____________
12 FT / ____________
14 FT / ____________
16 FT / ____________
18 FT / ____________
20 FT / ____________

[FOR EACH TEST PIT]

FIELD SAMPLE NO.: ____________

LOCATION DESCRIPTION: ____________

DEPTH OF SAMPLE: ____________ FEET

SAMPLE DESCRIPTION: ____________

ORGANIC VAPOR SCREENING - SAMPLE
OVA: ____________ PPM
HNu: ____________ PPM SPAN POT: ____________

CUSTODY TAG NUMBERS (HIGH/MEDIUM)
EXTRACTABLES: ____________
VOLATILES: ____________
INORGANICS: ____________
ADD'L PESTICIDES: ____________

REMARKS: ____________

[FOR EACH SAMPLE]

TABLE 6-3 STANDARD FORMAT SURFACE SOIL SAMPLE COLLECTION

SKINNER LANDFILL
SURFACE SOIL SAMPLING

LOGGED BY: ____________

DATE: ____________ AREA: ____________

FIELD SAMPLE NO.: ____________

SAMPLERS: ____________

WEATHER: ____________

TIME COLLECTION BEGAN: ____________ HRS
TIME COLLECTION ENDED: ____________ HRS

DEPTH INTERVAL: ____________ INCHES

AREA DESCRIPTION: ____________

SITE DESCRIPTIONS:

SOIL DESCRIPTIONS:

CUSTODY TAG NUMBERS: (MEDIUM)
EXTRACTABLES: ____________
VOLATILES: ____________
INORGANICS: ____________

REMARKS: ____________

[FOR EACH SAMPLE]

TABLE 6-4 STANDARD FORMAT MONITORING WELL INSTALLATION

SWINDLER LANDFILL
WELL INSTALLATION

LOGGED BY ______

LOCATION: ______ UNIT: ______

INITIALS: ______

______

______

WEATHER: ______

LOCATION DESCRIPTION: ______

______

TIME DRILLING BEGAN

DATE: ______ ______ HRS

TIME DRILLING ENDED

DATE: ______ ______ HRS

TIME INSTALLATION BEGAN

DATE: ______ ______ HRS

TIME INSTALLATION ENDED

DATE: ______ ______ HRS

TIME DEVELOPMENT BEGAN

DATE: ______ ______ HRS

TIME DEVELOPMENT ENDED

DATE: ______ ______ HRS

[FOR EACH WELL]

FIELD SAMPLE NO.: ______

TIME SAMPLE COLLECTED: ______ HRS

SAMPLE TYPE: SPLIT-SPOON -- SHELBY TUBE

DEPTH INTERVAL: ______

BLOW COUNTS (SPT) / RECOVERY (INCHES)

______ / ______

SAMPLE DESCRIPTION: ______

______

ORGANIC VAPOR SCREENING -- BOREHOLE

OVA ______ PPM

HNU ______ PPM STAN POT: ______

SAMPLE	OVA (PPM)	HNU (PPM)
TOP (C)		
MIDDLE (B)		
BOTTOM (A)		

CUSTODY TAG NOS: (C) ______

(B) ______ (A) ______

REMARKS: ______

______

[FOR EACH SAMPLE]

TABLE 6-4 (continued) STANDARD FORMAT MONITORING WELL INSTALLATION

TOTAL DEPTH OF BORING: ________ FEET

CASING FLUSHED CLEAN: YES -- NO

WELL CONSTRUCTION:

SCREEN LENGTH: ________ FEET

SLOT TYPE: MILLED -- CONTINUOUS

SLOT SIZE: ________ INCHES

WELL DIAMETER: ________ INCHES

RISER LENGTH: ________ FEET

RISER MATERIAL: ________

COUPLING METHOD: ________

DEPTH TO TIP OF SCREEN: ________ FEET

ANNULUS BACKFILLING (FEET)

CONCRETE: ________ TO ________

C/B GROUT: ________ TO ________

PELLET SEAL: ________ TO ________

FLINT SAND: ________ TO ________

CAVED SOIL: ________ TO ________

FLINT SAND: ________ TO ________

PELLETS & SAND: ________ TO ________

DEPTH OF SWABBING ZONE: ________ FEET

PROTECTIVE CASING

DIAMETER: ________ INCHES

LENGTH: ________ FEET

STICK-UP: ________ FEET

LOCKING: YES -- NO

WELL DEVELOPMENT:

INITIAL WATER DEPTH: ________ FEET

VOLUME IN WELL: ________ GALS.

VOLUME REMOVED: ________ GALS.

SURGE & PUMP CYCLES: 1 -- 2 -- 3 -- 4 -- 5

FINAL DISCHARGE CLEAR: YES -- NO

REMARKS: ________

[FOR EACH WELL]

BAIL-DOWN RECOVERY TEST

INITIAL WATER DEPTH ________ FEET
WELL DIAMETER ________ INCHES
WATER VOLUME REMOVED ________ GALS.

DURATION OF BAIL-DOWN ________ MINS.

RECOVERY MEASUREMENTS

TIME (MIN)	DEPTH (FEET)
0	
½	
1	
2	
5	
10	
20	
50	
100	

REMARKS: ________

[FOR EACH WELL]

TABLE 6-5 STANDARD FORMAT GROUNDWATER SAMPLE COLLECTION

SKINNER LANDFILL
GROUNDWATER SAMPLING

LOGGED BY: ____________

DATE: ____________ LOCATION: ____________

FIELD SAMPLE NO.: ____________

SAMPLERS: ____________

WEATHER: ____________

INITIAL WATER DEPTH: ________ FEET
TOTAL WELL DEPTH: ________ FEET

WATER VOLUME IN WELL: ________ GALS.

TIME PURGING BEGAN: ________ HRS
TIME PURGING ENDED: ________ HRS

DID WELL GO DRY: YES - - NO

WATER VOLUME PURGED: ________ GALS

LOCATION DESCRIPTION: ____________

TIME COLLECTION BEGAN: ________ HRS
TIME COLLECTION ENDED: ________ HRS

SAMPLE DESCRIPTION: ____________

FIELD MEASUREMENTS
pH ________ standard units

SPEC. COND: ________ umhos/cm

TEMPERATURE: ________ °C

METALS FIELD FILTERED: YES - - NO

CUSTODY TAG NUMBERS:
EXTRACTABLES: ____________
VOLATILES: ____________
METALS: ____________
CYANIDE: ____________

REMARKS: ____________

[FOR EACH SAMPLE]

TABLE 6-6 STANDARD FORMAT PRIVATE WELL SAMPLE COLLECTION

SKINNER'S LANDFILL
PRIVATE WELL SAMPLING

LOGGED BY: ______

DATE: ______ LOCATION: ______

FIELD SAMPLE NO.: ______

SAMPLERS: ______

WEATHER: ______

PUMP OPERATION STATUS: (RATE & DURATION) ______

TAP LOCATION: ______

TIME COLLECTION BEGAN: ______ HRS
TIME COLLECTION ENDED: ______ HRS

LOCATION DESCRIPTION: ______

SAMPLE DESCRIPTION: ______

FIELD MEASUREMENTS:
pH: ______ standard units
SPEC. COND.: ______ umhos/cm
TEMPERATURE: ______ °C

METALS FIELD FILTERED: YES -- NO

CUSTODY TAG NUMBERS
B/N/A EXTRCT: ______
PEST. & PCBs: ______
VOLATILES: ______
METALS: ______
CYANIDE: ______
MINERALS: ______
NUTRIENTS: ______

REMARKS: ______

[FOR EACH SAMPLE]

TABLE 6-7 STANDARD FORMAT SURFACE WATER SAMPLE COLLECTION

SKINNER LANDFILL
SURFACE WATER SAMPLING

LOGGED BY: ____

DATE: ____ LOCATION: ____

FIELD SAMPLE NO.: ____

SAMPLER: ____

TIME SINCE LAST RUNOFF: ____ DAYS

WEATHER: ____

TIME COLLECTION BEGAN: ____ HRS
TIME COLLECTION ENDED: ____ HRS

INTERMEDIATE BOTTLE USED: YES--NO

LOCATION DESCRIPTION: ____

SAMPLE DESCRIPTION: ____

FIELD MEASUREMENTS:
pH: ____ standard units

SPEC. COND: ____ umhos/cm

TEMPERATURE: ____ °C

METALS FIELD FILTERED: YES--NO

CUSTODY TAG NUMBERS
EXTRACTABLES: ____
VOLATILES: ____
METALS: ____
CYANIDE: ____

REMARKS: ____

[FOR EACH SAMPLE]

TABLE 6-8 STANDARD FORMAT SEDIMENT SAMPLE COLLECTION

SKINNER LANDFILL
SEDIMENT SAMPLING

LOGGED BY: ______

DATE: ______ LOCATION: ______

FIELD SAMPLE NO.: ______

SAMPLERS: ______

TIME SINCE LAST RUNOFF: ______ DAYS

WEATHER: ______

TIME COLLECTION BEGAN: ______ HRS

TIME COLLECTION ENDED: ______ HRS

LOCATION DESCRIPTION: ______

SAMPLE DESCRIPTION: ______

CUSTODY TAG NUMBERS:

EXTRACTABLES: ______

VOLATILES: ______

INORGANICS: ______

REMARKS: ______

[FOR EACH SAMPLE]

TABLE 6-9 STANDARD FORMAT DRUM RESIDUE SAMPLE COLLECTION

SKINNER LANDFILL
DRUM RESIDUE SAMPLING

DATE: ________ LOCATION: ________

SAMPLERS: ____________________
____

WEATHER: ____________________

TIME SAMPLING BEGAN: ________ HRS
TIME SAMPLING ENDED: ________ HRS

SAMPLING METHOD: ____________________
____
____

FIELD SAMPLE NO.: ________

DRUM IDENTIFICATION/NO.: ________
____

DEPTH OF RESIDUE IN DRUM: ________ IN
SOLID ______ LIQUID ______ SLUDGE ______

DEPTH OF SAMPLE: ________ IN

SAMPLE DESCRIPTION: ____________________
____
____

ORGANIC VAPOR SCREENING - SAMPLE
OVA ________ PPM
HNu ________ PPM SPAN POT.: ______

ORGANIC VAPOR SCREENING - SURFACE OF DRUM CONTENTS
OVA ________ PPM
HNu ________ PPM SPAN POT.: ______

CUSTODY TAG NUMBERS
EXTRACTABLES ________
VOLATILES ________ METALS ________
CYANIDE ________
REMARKS: ____________________
____

[FOR EACH SAMPLE]

SECTION 7

SAMPLING TEAM ORGANIZATION

The sampling team will consist of five to nine individuals (as appropriate to on-going field activities) whose roles and responsibilities are as follows:

- Field Manager--responsible for overall execution of the field program and sampling plan; will coordinate and expedite drilling activities for the borings and monitoring well installations, test pit excavation, and other sampling activities; will coordinate procurements and communications.

- Site Safety Officer and/or Assistant Safety Officer -- responsible for implementation of the site safety plan as contained in the site evaluation form (SEF); will operate OVA and HNU instruments for screening of soil samples during drilling and test pitting activities activities; will direct a two-man sampling team during some of the other sampling activities.

- Field Supervisors (1 to 2) -- responsible for overseeing, directing, and documenting sampling activities, including drilling for borings and monitoring well installation, test pitting, and other sample collection; will be assisted by sample collectors.

- Sample Collectors (1 to 2) -- primarily involved in sample collection, may assist with decontamination and/or sample handling.

- Decontamination Technician--primarily involved in decontamination of sampling equipment and sampling team personnel, may assist with sample collection and/or sample handling.

- Sample Handling Technician--primarily involved in sample packaging and processing of sample custody and tracking paper work, may assist with decontamination.

During boring and monitoring well installation activities, there will also be a driller and a helper from the firm subcontracted to provide drilling services present on site. During test pitting activities there will be an operator for the backhoe.

SECTION 8

SCHEDULING

The schedule for this sampling plan is shown in Figure 8-1. Mobilization will require about 5 days. This includes setting up office and decontamination facilities and stockpiling materials and equipment. Drilling activities (monitoring well installations and soil borings) are estimated at a total of about 15 to 18 working days assuming two rigs are used. All other sampling is estimated at 3 to 4 weeks. Because some of the sampling activities can be overlapped, the total duration of the primary field effort is 6 to 8 weeks. These estimates have assumed a start date in early January 1986. The second round of water supplies and groundwater sampling should only take one week, and is shown as occuring one month after the major field effort.

FIGURE 8

SAMPLING SCHEDULE

```
ACTIVITIES/WEEKS               0      1      2      3      4      5      6      7      8      9      10     11     12     13
------------------------       -------------------------------------------------------------------------------------------

Mobilization                   #======#             +                    +                    +                    +
                               +                    +                    +                    +                    +
                               +                    +                    +                    +                    +
Site Boundary and              #======#             +                    +                    +                    +
Grid/Elevation Surveys         +                    +                    +                    +                    +
                               +                    +                    +                    +                    +
Groundwater Use                +    #=#             +                    +                    +                    +
Survey (Verification)          +                    +                    +                    +                    +
                               +                    +                    +                    +                    +
Geophysical Surveys            +      #=============#                    +                    +                    +
                               +                    +                    +                    +                    +
                               +                    +                    +                    +                    +
Stream Ecology Survey          +      #==#          +                    +                    +                    +
                               +                    +                    +                    +                    +
                               +                    +                    +                    +                    +
Test Pits -- Soil/Waste        +                    #======#             +                    +                    +
                               +                    +                    +                    +                    +
                               +                    +                    +                    +                    +
Borings -- Soil/Waste          +                    +      #======#      +                    +                    +
                               +                    +                    +                    +                    +
                               +                    +                    +                    +                    +
Surface Soils                  +         #==#       +                    +                    +                    +
                               +                    +                    +                    +                    +
                               +                    +                    +                    +                    +
Monitoring Wells               +      #=========================================#             +                    +
                               +                    +                    +                    +                    +
                               +                    +                    +                    +                    +
Private Wells                  +             #==#   +                    +                    +                    +
                               +                    +                    +                    +                    +
                               +                    +                    +                    +                    +
Surface Water                  +                    +             #==#   +                    +                    +
                               +                    +                    +                    +                    +
                               +                    +                    +                    +                    +
Sediment                       +                    +                    #==#                 +                    +
                               +                    +                    +                    +                    +
                               +                    +                    +                    +                    +
Groundwater                    +                    +                    +      #======#      +                    #======#
```

APPENDIX A

Procedures for Field Measurement of pH, Specific Conductance and Temprature of Water Samples

Field Measurement of pH in Water

1. Scope and Application

   This method is applicable to samples of stormwater, surface water, water supplies and groundwater with measurement occurring at the sampling location.

2. Summary of Method

   The pH of water is determined using a portable, field pH meter with a temperature-compensated combination electrode.

3. Apparatus

   A) Haake Buchler pH Meter Stick
   B) 100 ml disposable beakers

4. Reagents

   A) pH reference buffer solutions:

      1) pH = 4.00 ±.01
      2) pH = 7.00 ±.01
      3) pH = 10.00 ±.01

   B) distilled water

5. Sample Handling and Preparation

   Sample aliquots for pH measurement should be obtained directly from the sampling point in 100 ml disposable beakers. Groundwater samples being tested during well purging can be obtained from the pump discharge line.

6. Calibration

   Calibrate the meter/electrode using two reference solutions that bracket the expected pH of the sample. Reference solutions should be at room temperature. Immerse the electrode in pH 7.00 solution and adjust the meter as needed. Remove and rinse the electrode and repeat using the second buffer solution. Repeat adjustments until readings are within 0.05 pH units of the reference values.

7. Procedure

   Immerse the electrode in the water while gently agitating. After about one-half minute, record the pH reading to the nearest 0.05 units -- provided the meter readings are not fluctuating more than ±0.03 units. Be sure that temperature compensation has been provided for. Remove and thoroughly rinse the electrode with distilled water. Repeat the measurement procedure until four readings have been obtained.

8. Interferences

Prolonged immersion of the electrode in turbid solutions can lead to plugging of the liquid junction and erratic meter readings. The electrode should be cleaned by gently blotting with a lab tissue and rinsing with distilled water.

9. Verification of Accuracy

Following the last of the four replicate measurements, immerse the rinsed electrode in each of the reference buffer solutions used to calibrate the meter/electrode prior to sample measurements. If the readings are not within 0.05 units of the reference values, recalibrate the meter/electrode and re-do the measurement of the sample just tested.

10. Assessment of Precision

Calculate the mean and standard deviation of the four replicate measurements. If the standard deviation is greater than 0.1 units, re-do the measurement of the sample just tested including calibration and verification.

11. Reporting

Report the average value of the replicate measurements to the nearest 0.1 units.

Field Measurement of Specific Conductance and Temperature

1. Scope and Application

This method is applicable to samples of storamwater, surface water, water supplies and groundwater with measurement occurring at the sampling point.

2. Summary of Method

The specific conductance and temperature of water is determined using a portable, field conductivity meter having manual temperature compensation.

3. Apparatus

A) YSI Model 33 S-C-T Meter with weighted probe
B) 100 ml disposable beakers

4. Reagents

A) 0.01 N KCl reference solution
B) distilled water

5. Sample Handling and Preparation

Sample aliquots for specific conductance and temperature should be obtained directly from the sampling point in 100 ml disposable beakers. Groundwater samples being tested during well purging can be obtained from the pump discharge line.

6. Calibration

Calibrate the thermometer in the probe against the thermometer in the field laboratory. Readings should be within ± 1°C. Calibrate the specific conductance meter using the 0.01 N KCl reference solution. The specific conductance of this solution is 1413 umhos/cm at 25°C. Adjust the meter as needed. Temperature calibration should be performed weekly. Specific conductance calibration should be performed daily during the period of use.

7. Procedure

Check battery condition by turning selector dial to "Red Line". Adjust meter as needed. Immerse the probe in the beaker while gently agitating. Turn selector dial to "Temperature" and record temperature to nearest 0.5°C. Adjust manual temperature compensation dial to temperature of water. Turn selector dial to "Conductivity" at the scale range appropriate to sample conductance. Record specific conductance to three significant digits. Remove and thoroughly rinse the probe with distilled water. Repeat temperature and specific conductance measurements until four sets of readings have been obtained.

8. Assessment of Precision

Calculate the mean and standard duration of the four specific conductance measurements. If the standard deviation is greater than 5% of the mean, re-do the measurement of the sample just tested.

9. Reporting

Report the average values of the replicate measurements to the nearest 1°C for temperature and to three significant digits for specific conductance.

TABLE 2-1

INVESTIGATION AREAS AT SKINNER LANDFILL

1. Northeast Corner
2. Landfill
3. North Shoulder
4. Central Shoulder
5. Lagoon
6. South Shoulder
7. East Woods
8. Southeast Woods
9. Upper East Fork Valley
10. Middle East Fork Valley
11. Dry Valley
12. East Fork Narrows
13. Hilltop
14. North Bench
15. Central Bench
16. South Bench
17. Upper Skinner Creek Valley
18. Middle Skinner Creek Valley
19. West Woods
20. North Woods
21. Lower Stream Valleys
22. Homestead

Note: Refer to Figure 2-1 for area locations

APPENDIX B

Compatibility Testing For Waste Compositing

COMPATIBILITY TESTING FOR WASTE COMPOSITING

Purpose

The purpose of this protocol is to provide preliminary characterization of waste materials and permit the formation of compatible composite samples for future laboratory preparation and/or analysis.

Approval

Figure 1 shows a simplified schematic of the protocol, which is based on the assumption that the wastes contain a mixture of sludges and liquids. The protocol provides a guideline for:

- o Subdividing wastes into general testing categories
- o Providing for field testing for all categories
- o Determining if the wastes within each category are compatibile by actual compatibility testing.

Through the application of the field testing scheme, the following points are achieved:

- o Radioactive wastes are identified and isolated.
- o Wastes containing toxic, gas-forming compounds (cyanide, sulfide) are identified and segregated for special handling. Consolidation at a later date may taken place after performing a compatibility testing procedures outlined in the protocol.
- o Organic and inorganic wastes are separated.
- o Organic wastes are segregated by applying water solubility, reactivity and relative density testing into the groups: halogenated organics (denser than water), non-halogenated hydrocarbons (lighter than water), and water soluble organics.
- o The compatibility test is performed at the site by mixing small samples. Visual observation for precipitation or phase separation are made, and the temperature is measured as a test of reactivity.

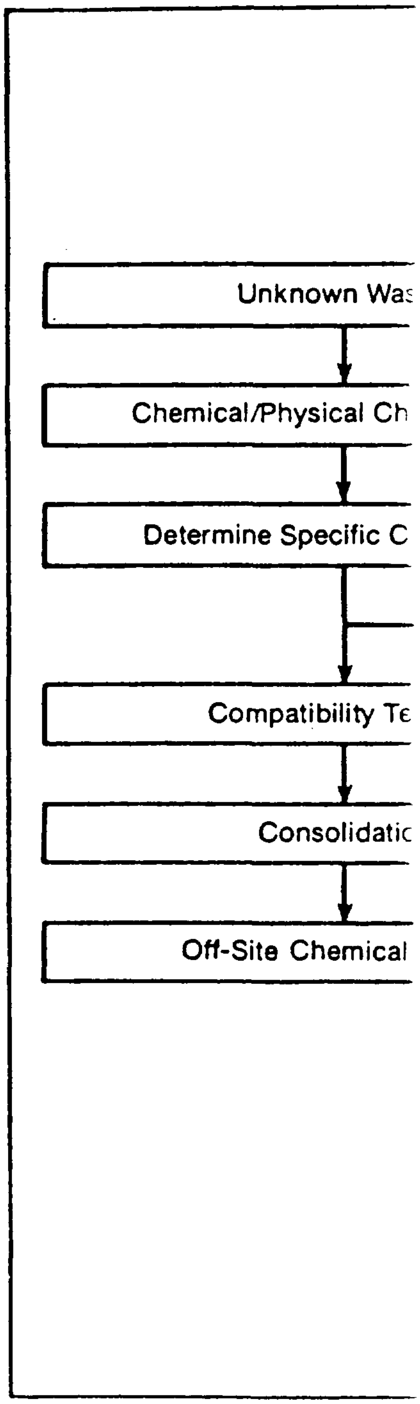

Unknown
Chemical/Physical
Determine Specific
Compatibility
Off-Site Chemical

FIGURE 1

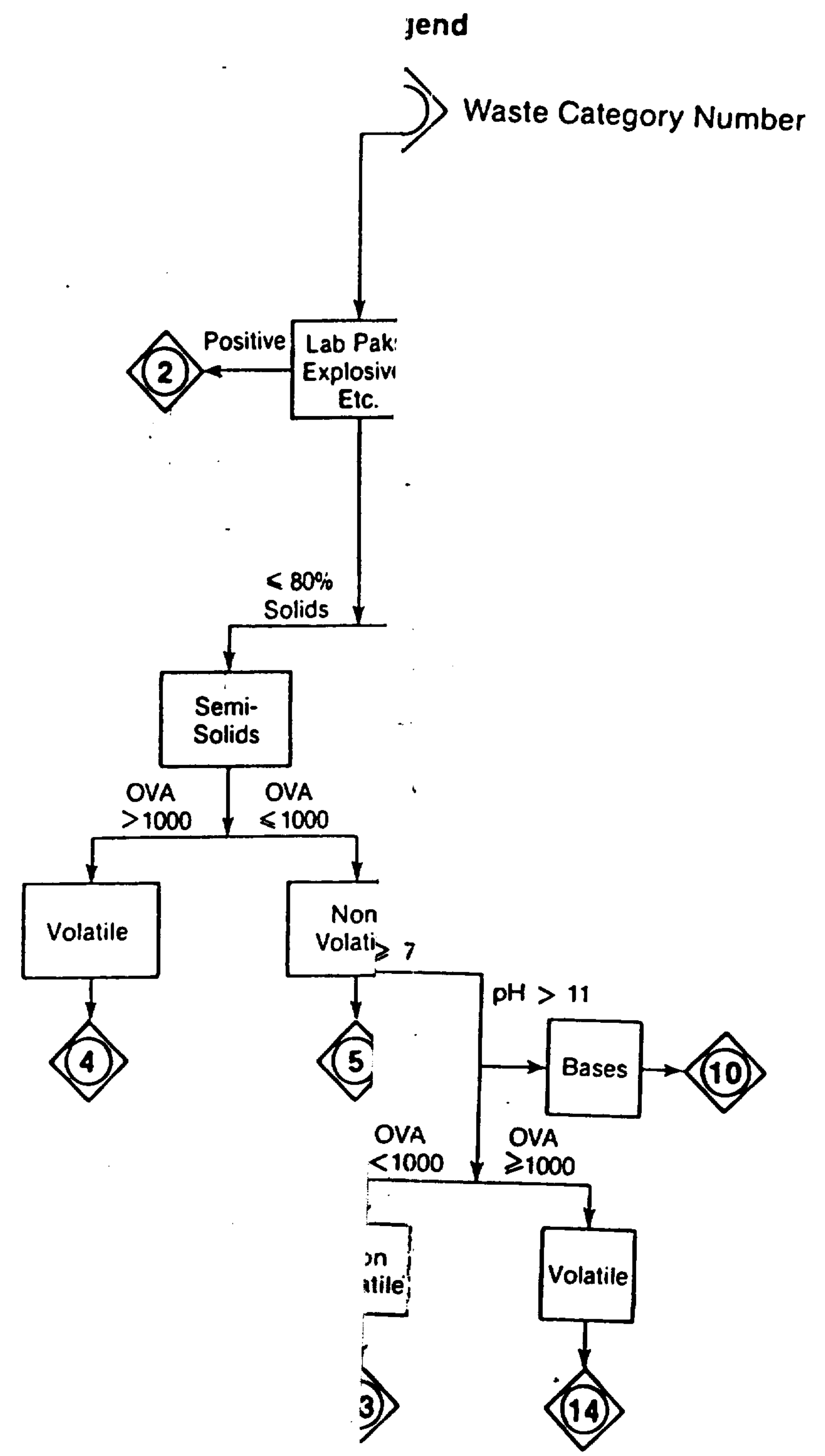


FIGURE 2 WASTE CATEGORIZATION DECISION TREE

Waste Compatibility Testing

Compatibility tests are performed in each of the categories into which the wastes have been segregated, except for the radioactive or lab pack categories. This process is designed to check acute noncompatibility only. Reactions which require heat or other catalyzing effects for initiation may not be detected by this test. Depending upon the type of wastes encountered at sites and analytical facilities available, more sophisticated compatibility tests such as differential thermal analysis on accelerated rate calorimetry could be used to evaluate the compatibility of the blend.

The compatibility test for liquid waste is qualitative, designed to determine the compatibility of liquids of unknown composition at ambient temperatueres. The test method is designed for use in the field. This method is applicable to both organic and aqueous wastes. All wastes tested by this method should be tested for water reactivity prior to compatibility testing.

Samples of liquid waste are tested in batches of 10 at ambient temperatures. If waste incompatibility is detected at ambient temperature, the reactive waste is marked as reactive and incompatible with the batch. To implement the procedure, 10 ml of the first waste sample are added to the reaction vessel. Each of the remaining waste aliquots are added to the reaction vessel sequentially, stirring after each addition. Observations for temperature increases, gas formation, immiscibility or precipitation of solids are observed. If a reaction occurs after the addition of a waste sample, binary combinations of the last aliquot tested with each of the previous aliquots are tested. Both reactive samples are eliminated from the consolidation plan.

Information that should be provided on each batch includes:

- Identification of each waste
- Temperature after each addition
- Miscibility of the material after each addition
- Formation of precipitates after each addition
- Gas formation after each addition
- The exact order of addition of each waste
- Other comments (color/viscocity of the final mixture).

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CLP Sample Management Office
P. O. Box 818, Alexandria, Virginia 22313
PHONE: (703)/557-2490 or FTS/557-2490

SAS Number

SPECIAL ANALYTICAL SERVICES
Client Request

☐ Regional Transmittal ☐ Telephone Request

A. EPA Region/Client: Skinner Landfill, Region V

B. RSCC Representative: Dennis Wesolowski

C. Telephone Number: 312-886-1971

D. Date of Request: June 13, 1986

E. Site Name: Skinner Landfill

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability f your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delay in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. General description of analytical service requested: Preparation of high hazard extracts according to procedures described in SAS 1997I.

2. Definition and number of work units involved (specify whether whole samples or fractions; whether organics or inorganics; whether aqueous or soil and sediments; and whether low, medium, or high concentration):

   Total of 59 High Hazard Extracts (53 investigative samples, 6 field duplicates)

3. Purpose of analysis (specify whether Superfund (Remedial or Enforcement), RCRA, NPDES, etc.):

   Superfund RI/FS activity at Fund-lead site

4. Estimated date(s) of collection: ______

5. Estimated date(s) and method of shipment: from HSL

6. Number of days analysis and data required after laboratory receipt of samples:

45 days

7. Analytical protocol required (attach copy if other than a protocol currently used in this program):

Analytical Procedures described in SAS 1997I

8. Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.): Add the following compounds to calibration standards (if authentic standards are available): Hexachloronorboradiene, Octachlorocyclopentene, Heptachloronorborene, Chlordene

These componds should be added to matrix spike/matrix spike duplicate/matrix spike triplicate at a frequency of once per case or once per batch of 20 samples whichever is fewer. These four compounds should be added to the method validation required by SAS 1997I.

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain-of-Custody documentation, etc.). If not completed, format of results will be left to program discretion.

As required by SAS 1997I, Section B

10. Other (use additional sheets or attach supplementary information, as needed):

11. Name of sampling/shipping contact: Vendy Denar, COM

I. DATA REQUIREMENTS

Parameter:	Detection Limit	Precision Desired (±% or Conc.)
Hexachloronorboradiene	As determined	As determined
Octachlorocylcopentene	in initial method	in initial method
Heptachloronorborene	validation required	validation required
Chlordene	by SAS 1997I	by SAS 1997I

II. QC REQUIREMENTS

Audits Required	Frequency of Audits	Limits* (% or Conc.)
Matrix Spike (all target compounds)	With each batch of samples	As per requirements
Matrix Spike Duplicate	or with every 20 samples	in Section E of
Matrix Spike Triplicate	whichever is fewer	SAS 1997I

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

As described in Section E of SAS 1997I.

Contact Dennis Wesolowski - Region V EPA (312) 886-1971

Please return this request to the Sample Management Office as soon as possible to expedite processing of your request for special analytical services. Should you have any questions or need any assistance, please call the Sample Management Office.

U.S. Environmental Protection Agency
CLP Sample Management Office
P. O. Box 818, Alexandria, Virginia 22313
PHONE: (703)/557-2490 or FTS/557-2490

SAS Number

SPECIAL ANALYTICAL SERVICES
Client Request

[ ] Regional Transmittal   [ ] Telephone Request

A. EPA Region/Client: Region V, Skinner Landfill

B. RSCC Representative: Dennis Wesolowski

C. Telephone Number: 312- 886-1971

D. Date of Request: June 13, 1986

E. Site Name: Skinner Landfill

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delay in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. General description of analytical service requested: Analysis of high hazard samples for inorganic HSL analytes using procedures described in SAS 1762I.

2. Definition and number of work units involved (specify whether whole samples or fractions; whether organics or inorganics; whether aqueous or soil and sediments; and whether low, medium, or high concentration):

   59 High Hazard Samples (53 investigative samples, 6 field duplicates)

3. Purpose of analysis (specify whether Superfund (Remedial or Enforcement), RCRA, NPDES, etc.):

   Superfund RI/FS activity @ Fund Lead Site

4. Estimated date(s) of collection: ____________________

5. Estimated date(s) and method of shipment: from HSL

6. Number of days analysis and data required after laboratory receipt of samples:

45 days

7. Analytical protocol required (attach copy if other than a protocol currently used in this program):

As described in SAS 1762I

8. Special technical instruction (if outside protocol reouirements, specify compound names, CAS numbers, detection limits, etc.): As described in SAS 1762I

9. Analytical results required (if known, specify format for data sheets, OA/OC reports, Chain-of-Custody documentation, etc.). If not completed, format of results will be left to program discretion.

As described in SAS 1762I

10. Other (use additional sheets or attach supplementary information, as needed):

11. Name of sampling/shipping contact: Wendy Nowar, CDM

Phone: [illegible]

I. DATA REQUIREMENTS

Parameter:	Detection Limit	Precision Desired (±% or Conc.)
According to SAS 1762I		

II. QC REQUIREMENTS

Audits Required	Frequency of Audits	Limits* (% or Conc.)
According to SAS 1762I		

II. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Notify: Dennis Wesolowski - Region V EPA (312) 886-1971

P ease return this request to the Sample Management Office as soon as possible to expedite processing of your request for special analytical services. Should you have any questions o need any assistance, please call the Sample Management Office.

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SAS Number

SPECIAL ANALYTICAL SERVICES
Client Request

☐ Regional Transmittal ☐ Telephone Request

A. EPA Region/Client: Region V, Skinner Landfill

B. RSCC Representative: Dennis Wesolowski

C. Telephone Number: 312- 886 - 1971

D. Date of Request: June 13, 1986

E. Site Name: Skinner Landfill

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delay in the processing of your request. Please continu response on additional sheets, or attach supplementary information as needed.

1. General description of analytical service requested: Analysis of High Hazard Extracts for organic HSL compounds including library searching of 10 non-HSL peaks in VOA analysis and 30 non-HSL compounds in B/N/A fraction. Also includes special pesticide analysis as outlined in Tables I and II.

2. Definition and number of work units involved (specify whether whole samples or fractions; whether organics or inorganics; whether aqueous or soil and sediments; and whether low, medium, or high concentration):

   59 High Hazard Extracts (53 investigative samples, 6 field duplicates) 37 of which will include additional pesticide analysis (33 investigative samples, 4 field duplicates)

3. Purpose of analysis (specify whether Superfund (Remedial or Enforcement), RCRA, NPDES, etc.):

   Superfund RI/FS at Fund-lead site

4. Estimated date(s) of collection: ______

5. Estimated date(s) and method of shipment: from HSL

6. Number of days analysis and data required after laboratory receipt
45 days

7. Analytical protocol required (attach copy if other than a protocol this program):
According to procedures in SAS 1997I

8. Special technical instruction (if outside protocol requirements, speci names, CAS numbers, detection limits, etc.): Note A: Identification of compounds in the VOA and B/N/A fraction using GC/MS computerized libra will conform to the identification criteria given in Section D of the a SAS. Note B: Analyse for the compounds in table I initially using GC SOW for pesticides. For any samples where compounds are found in quanti than the requested detection limit for GC/MS (TableI) these samples must GC/MS according to SOW for A/B/N fraction. Pesticide protocol (GC/EC) as WA-85 J664/J630 and Base/Neutral/Acid extructable protocol (GC/MS) as per CLP

9. Analytical results required (if known, specify format for data sheets, QA Chain-of-Custody documentation, etc.). If not completed, format of resul left to program discretion.
As required by SAS 1997I, Section B

10. Other (use additional sheets or attach supplementary information, as neede

11. Name of sampling/shipping contact: Wendy Dewar CDM

Phone: 312- ...

I. DATA REQUIREMENTS

Parameter:	Detection Limit	Precision Desired (±% or Conc.)
As required by SAS 1997I		
See Table I		

II. QC REQUIREMENTS

Audits Required	Frequency of Audits	Limits* (% or Conc.)
As required by SAS 1997I		
See Table II		

I. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Contact Dennis Wesolowski - Region V EPA (312) 886-1971

Please return this request to the Sample Management Office as soon as possible to expedite processing of your request for special analytical services. Should you have any questions or need any assistance, please call the Sample Management Office.

TABLE I

Task: Analysis of soil extracts for seven organochloride hydrocarbons, 3 of which are currently HSL compounds and 4 of which are not. To be analyzed using GC/EC and GC/MS.

Compound	Requested Limit for GC/EC (ug/l)	Requested Limit for GC/MS (ug/l)
Hexachlorobenzene	0.05	1.5
Hexachlorocyclopentadiene	0.10	2.0
Hexachlorobutadiene	0.05	1.0
Hexachloronorboradiene	0.05	1.0
Octachlorocyclopentene	0.05	1.0
Heptachloronorborene	0.05	1.0
Chlordene	0.05	1.0

TABLE II

QC LEVEL OF EFFORT FOR CRL ANALYTICAL SERVICES

Method of Analysis	Lab Blanks	Spikes or Surrogates/Spikes	Lab Duplicates	Matrix Spike Duplicate
GC/MS	One per set of samples or a minimum of 1 in 10	Surrogates added to each sample and matrix spikes added to one sample per set	NR	One per set of samples or a minimum of 1 in 10
GC/EC	One per set of samples or a minimum of 1 in 10	One spike per set of samples or a minimum of 1 in 10	One per set of samples or a minimum of 10	One per set of samples or a minimum of 1 in 10

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SAS Number

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal [ ] Telephone Request

A. EPA Region/Client: EPA Region V, Skinner Landfill

B. RSCC Representative: Dennis Wesolowski

C. Telephone Number: 312- 886 - 1971

D. Date of Request: June 13, 1986

E. Site Name: Skinner Landfill

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delay in the processing of your reouest. Please continu response on additional sheets, or attach supplementary information as needed.

1. General description of analytical service requested: Analysis of samples for CLP organics package including library search of 10 non-HSL peaks in VOA analysis and 30 non-HSL compounds in A/B/N fraction. Also includes special pesticide analysis as outlined in Tables I and II.

2. Definition and number of work units involved (specify whether whole samples or fractions; whether organics or inorganics; whether aqueous or soil and sediments; and whether low, medium, or high concentration):

   24 Medium Hazard Soil Samples (22 Investigative, 2 Duplicate)

3. Purpose of analysis (specify whether Superfund (Remedial or Enforcement), RCRA, NPDES, etc.):

   Superfund RI/FS Activity at Fund -lead Site

4. Estimated date(s) of collection: ____________

5. Estimated date(s) and method of shipment: ____________

6. Number of days analysis and data required after laboratory receipt of samples:

45 days

7. Analytical protocol required (attach copy if other than a protocol currently used in this program):

Pesicide protoclos (GC/EC) per CLP SOW WA-85-J664/J680 and Acid/Base/Neutral extractable protocols (GC/MS) per CLP SOW WA-85-J664/J680 Analyze for the compounds in Table I initially using GC/EC according to SOW for pe ticides. For any samples where compounds are found in quantities greater than the requested detection limit for GC/MS (Table I) these sample must be run using GC/MS according to SOW for AB/N fraction.

8. Special technical instruction (if outside protocol reouirements, specify compound names, CAS numbers, detection limits, etc.): The folowing compounds should be added to the IFB calibration standards and matrix spike compounds for each method: Hexachloronorboradiene, Oclochlorocyclopenton, Heplachloronorborene, Chlordene

9. Analytical results required (if known, specify format for data sheets, OA/OC reports, Chain-of-Custody documentation, etc.). If not completed, format of results will be left to program discretion.

As per SOW WA85- J664/J680

10. Other (use additional sheets or attach supplementary information, as needed):

11. Name of sampling/shipping contact: Wendy Dewar, CDM

I. DATA REQUIREMENTS

Parameter:	Detection Limit	Precision Desired (+% or Conc.)
See Table I		As defined for HSL
		organochlorine pesticides
		in RAS-SOW WA85-J664/J680

II. QC REQUIREMENTS

Audits Required	Frequency of Audits	Limits* (% or Conc.)
See Table II		

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Contact Dennis Wesolowski - Region V EPA (312) 886-1971

Please return this request to the Sample Management Office as soon as possible to expedite processing of your request for special analytical services. Should you have any questions or need any assistance, please call the Sample Management Office.

TABLE I

Task: Analysis of soil extracts for seven organochloride hydrocarbons, 3 of which are currently HSL compounds and 4 of which are not. To be analyzed using GC/EC and GC/MS.

Compound	Requested Limit for GC/EC (ug/l)	Requested Limit for GC/MS (ug/l)
Hexachlorobenzene	0.05	1.5
Hexachlorocyclopentadiene	0.10	2.0
Hexachlorobutadiene	0.05	1.0
Hexachloronorboradiene	0.05	1.0
Octachlorocyclopentene	0.05	1.0
Heptachloronorborene	0.05	1.0
Chlordene	0.05	1.0

TABLE II

QC LEVEL OF EFFORT FOR CLP ANALYTICAL SERVICES

Method of Analysis	Lab Blanks	Spikes or Surrogates/Spikes	Lab Duplicates	Matrix Spike Duplicate
GC/MS	One per set of samples or a minimum of 1 in 10	Surrogates added to each sample and matrix spikes added to one sample per set	NR	One per set of samples or a minimum of 1 in 10
GC/EC	One per set of samples or a minimum of 1 in 10	One spike per set of samples or a minimum of 1 in 10	One per set of samples or a minimum of 10	One per set of samples or a minimum of 1 in 10

Environmental Protection Agency
Sample Management Office
Box 818, Alexandria, Virginia 22313
PHONE: (703) 557-2490 or FTS-557-2490

SAS Number

SPECIAL ANALYTICAL SERVICES
Regional Request

Regional Transmittal ☐ Telephone Request

EPA Region and Site Name: V / Skinner Landfill

Regional Representative: Dennis Wesolowski

Telephone Number: ( ) 312-886-1971

Date of Request: June 13, 1986

Please provide below a description of your request for Special Analytical Services under the Uncontrolled Hazardous Waste Dumpsite Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if possible. Incomplete or erroneous information may result in delay in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

I. General description of analytical service requested:

Determination of Total Suspended Solids (TSS) (or"Total Nonfilterable Residue")

II. Definition and number of work units involved (specify whether whole samples or fractions; whether organics or inorganics; whether aqueous or soil and sediments; and whether low, medium, or high concentration):

18 surface water samples - 15 investigative, 2 duplicates, and 1 blank

These samples are also being analysed for total and dissolved metals, and organics

III. Purpose of analysis (specify whether Superfund (Remedial or Enforcement), RCRA, NPDES, etc.):

Superfund Remedial Investigation

IV. Estimated date(s) of collection:

V. Estimated date(s) and method of shipment: Federal Express Overnite Air

Approximate number of days results required after lab receipt of samples:

30 days

Analytical protocol required (attach copy if other than a protocol currently used in this program):

1. EPA Method 160.2 (Gravimetric, Dried at 103° - 105° C) with Glass Fiber filterdiscs, without organic binder, such as Millipore AP-40, Reeves Angel 934-AH, Gèlman A/E, or equivalent are to be used. Membrane filter apparatus using 47 mm diameter glass fiber filter and coarse (40-60) micron fritted disc as filter support is to be used. The specifications of Glass fiber filter filter support are mandatory.

Special technical instructions (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):

. Do not filter more than 200 ml sample aliquot.

. Filter 100 ml of reagent water prior to taring of filter.

. Duplicate sample aliquots will be filtered with two or more intervening samples.

. Aliquot filtered should provide residue greater than 1.0 mg (for aliquots less than 200 ml)

. Final weight is to be used for calculations. Residues are to be weighed to constant weight pursuant to Part 7.1 of Method 160. 1.

. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain-of-Custody documentation, etc.). If not completed, format of results will be left to program discretion.

Identify EPA WP QC reference samples used and lot numbers. Specify manufacturer type, and diameter (mm) of glass fiber filter used. Bench records of tare weights, final weights, volumes filtered, order of blanks, duplicates, samples filtered will be provided along with (cont.)

. Other (use additional sheets or attach supplementary information, as needed):

All calculated concentration values are to be reported including negative values.

. Name of sampling/shipping contact: Wendy Dewar

Phone: 312- 7?6-0253

Please return this request to the Sample Management Office as soon as possible to expedite processing of your request for special analytical services.

Data Requirements

arameter:	Detection Limit	Precision Desired (±% or Conc.)
Suspended Solids	2-3 mg/l for 200 ml sample aliquot	Difference in duplicate results shall not exceed 0.5 mg on aliquot filtered

ǪC Requirements

Audits Required	Frequency of Audits	Limits* (% or Conc.)
1. Duplicates	1 per 10 samples or less	±0.5 mg
2. Blanks (200 ml alquot)	1 per 10 samples or less	-0.5 to +0.5 mg
3. Lab Control Standard		
1 set of 2 EPA WP QC Residue Samples	1 set of 2 EPA QC at beginning and end of run or maximum of 2 times.	$\leq$5 mg/l for nominal concentrations $\leq$50mg/l or <10% for nominal concentrations >50 mg/l

***Action Required if Limits are Exceeded:**

Retest Samples

Contact Dennis Wesolowski at 312-353-9087